THE ADJUSTMENT OF GROWTH HORMONE DEFICIENT CHILDREN: PARENT, TEACHER, PEER, AND SELF-PERCEPTIONS

By

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The general picture of the growth hormone deficient child that emerges from the literature to date is one of an immature, socially-withdrawn child with a low self-concept who has significant school problems despite at least average intelligence.

The present investigation looked at the adjustment of 45 growth hormone deficient children being treated with human growth hormone from the perspectives of a number of different sources. Parents, teacher, and the growth hormone deficient children themselves completed measures concerning the behavioral adjustment and self-esteem of these children and a group of normal height control children. Peers completed sociometric ratings which provided data about the two groups of children.

The growth hormone deficient children rated themselves as having lower self-esteem than did the normal height children. Mothers and peers rated them as more withdrawn than the normal height children. Both mothers and fathers of the growth hormone deficient children rated their children as significantly less socially competent than did the parents of

normal height children. Compared to normal height children, teachers rated the growth hormone deficient children as having worse grades, putting forth less effort, learning less, and being less happy. While the growth hormone deficient children were not disliked by their peers relative to normal height children, neither were they popular.

Looking at the correspondence between the ratings by different sources, mother and father ratings were highly related to each other. Peer and child self-ratings also showed a pattern of significant relationships. Parental ratings of social competence were significantly related to peer ratings of social withdrawal and being a relatively disliked classmate.

Lastly, growth hormone deficient children who overestimated their height relative to peers also endorsed extremely elevated levels of self-esteem.

Overall, these results indicate that growth hormone deficient children have lower self-esteem than normal height children, they are seen by a number of sources as less socially competent than peers, and are rated by peers as socially withdrawn. Growth hormone deficient children who overestimate their height also appear to have inflated self-esteem.

CHAPTER I
INTRODUCTION

Problem

The focus of the present investigation is the behavioral adjustment of growth hormone deficient children. At the time of this study all of the growth hormone deficient children who participated were receiving human growth hormone therapy as treatment for their disorder. This treatment involved taking injections of growth hormone purified from the pituitary glands of human cadavers. This form of treatment had been available for approximately 25 years. Prior to the availability of growth hormone replacement therapy, these children remained about the size of an early grade school child and were called "midgets". Even with treatment, however, growth rates were variable with most growth hormone deficient children getting taller yet continuing to be noticeably short for their age and sex (Soyka, Bode, Crawford, & Flynn, 1970; Shizume, 1984; Schaff-Blass, Burstein, & Rosenfield, 1984). In 1985 human growth hormone was taken off the market due to contamination of some lots with a virus that later causes Creutzfeldt-Jakob disease. Later that year biosynthetic growth hormone became available.

The current study compared perceptions of the behavioral adjustment and self-esteem of a group of growth hormone deficient children being treated with human growth hormone and a group of normal height control children. Mothers, fathers, teachers, peers, and the children themselves participated in the study.

Short Stature

There are a number of reasons for short stature in childhood. Some are fairly innocuous and merely represent variations of normal linear growth. For example, some children are the offspring of relatively short parents and therefore may be short for familial or genetic

reasons. Other children may grow at a rate much slower than their peers but eventually will catch up with them. Both of these are examples of variations in normal growth patterns.

Short stature may also result from several pathological conditions. Psychosocial deprivation may cause delayed growth. Upon removal from the offending environment, these children may attain relatively normal height. Physical problems also may result in short stature. These include Turners' syndrome (a genetic disorder), achondroplasia (a bone and cartilage disorder), craniopharnygioma (a tumor), and pituitary growth hormone deficiency.

Reports of the prevalence of growth hormone deficiency have varied greatly from 1 in 30,000 (Parkin, 1974) to 1 in 4,000 (Vimpani et al., 1981). The later study accounted for the discrepancy between their findings and that of other investigations by suggesting that many cases are missed due to professional inactivity and not because of lack of parental concern. The authors concluded that growth hormone deficiency in a non-disadvantaged community may account for 5% of total cases of short stature or 10% of all short but otherwise normal children.

The criterion for short stature varies somewhat in different investigations. One criterion commonly found is height below the third percentile for age and sex (see Schaff-Blass et al., 1984). A diagnosis of growth hormone deficiency usually can be made only after at least two diagnostic tests show a deficiency. These tests consist of evaluation of serum growth hormone after either insulin-induced hypoglycemia, arginine infusion, L-dopa stimulation, or glucagon administration (see Ad Hoc Committee on Growth Hormone Usage, 1983). The growth hormone deficient child may grow less than 2.5 ± 0.8 cm. per year (Kaplan, 1975) while the normal child generally grows at least 5 ± 1.5 cm. per year (Daughaday, 1974).

Psychosocial Problems Associated with Short Stature

Short children encounter a series of psychosocial problems as they age (see Drash, 1969). The major issue from birth to 4 years of age is the identification of growth hormone deficiency. The adjustment of the child during this time period is in part determined by his parents' personalities. Money and Pollitt (1966) introduced the concept of "complementarity of pathology" to account for the observation that a child's adjustment to his growth problem is partly determined by the response of his parents to the problem. For example, he may be encouraged to act according to his size, not his age, a pattern due at least partially to parental needs and conflicts.

During the ages of 5 and 6 the child may be introduced to a school setting for the first time with all of the adjustments that entails. This may be a particularly difficult separation for a child who has been encouraged to be relatively more dependent than his peers. Teasing, ridicule and physical bullying by peers is often first encountered to any large extent in grades 2-4 (ages 7-9). It is during these years that the child may first become acutely aware of his "difference." The child may react to teasing by passive resignation and withdrawal, mascotism and laughing at himself, physical aggression, befriending a larger "protector," or using humorous replies.

The adolescent years are filled with many potential "crises" for the short statured child. His younger siblings may be passing him in height, he may become especially aware of his conditon as same sex competition increases in a number of areas including heterosexual relations. If there are other associated pituitary deficiencies the child may also not develop secondary sexual characteristics without appropriate hormone replacement. The common personality "mechanisms" exhibited by short statured adolescents according to Drash (1969) are immaturity and developmental retardation (not uncommonly at least two years delay), denial, withdrawal, exaggeration and overcompensation, mascotism, and the use of humor. The

most common parental problems are treating the child according to his size rather than his age, denial, and failure to look for psychological problems in the child.

Direct Psychological Effects of Human Growth Hormone

Growth hormone is a pituitary hormone and is largely regulated by the central nervous system. Growth hormone levels may vary according to the amount of stress one is experiencing. Its usual pattern of responding may also be altered in the presence of endogenous depression, possibly related to an underlying neurotransmitter problem. However, reduction or elimination of growth hormone due to defective pituitary function does not appear to produce direct psychological effects (Brown, Seggie, Chambers, & Ettigi, 1978).

Intellectual Functioning

Much of the earliest research on growth hormone deficient children of a psychological nature asked whether intellectual retardation accompanied the physical growth retardation. Pollitt and Money (1964) gave age-appropriate standardized intelligence tests (WISC, Binet, or Gesell Development Schedules) to 15 growth hormone deficient children aged 3 to 15 years. The mean full scale IQ was 103 for the WISC and Binet combined. These scores are equivalent to the published normative means of 100. There was also no significant verbal-performance IQ difference. School performance, however, was average or below average for all subjects with teacher comments suggesting lack of interest and poor study habits. Pollitt and Money concluded that for their sample the search for approval from peers and teachers seems to interfere with school work.

Further work by this same group on intelligence (Money, Drash, & Lewis, 1967) found a normal distribuiton of intelligence in their sample of 36 subjects aged 5 to 36 with growth

hormone deficiency. Drash, Greenberg and Money (1968) compared their previously obtained IQ results for growth hormone deficient subjects with that from samples of people with short stature due to three other causes. Subjects with short stature due to depreviation syndrome had an IQ distribution indicating intellectual impairment. Turner's syndrome subjects showed generally low performance IQ's with normal verbal and full scale IQ's. The sample of subjects with achrondroplasia was small but seemed to show normal intelligence. At least three other studies (Rosenbloom, Smith, & Loeb, 1966; Cacciaguerra, 1978; Meyer-Bahlburg, Feinman, MacGillvray, & Aceto, 1979) have found normal intelligence in their samples of growth hormone deficient subjects. The subjects in the first of these studies also evidenced satisfactory academic achievement.

At least two studies have found impaired intelligence in samples composed of growth hormone deficient subjects (Obuchowski et al., 1970; Frankel & Laron, 1968). Frankel and Laron (1968) also found marked verbal-performance IQ discrepancies and marked subtest scatter. Additionally performance on the Bender Visual-Motor Gestalt Test was generally deficient. Visual-motor difficulties were also found by Abbott and her colleagues (Abbott, Rotnem, Genel, & Cohen, 1982). The 11 children studied in their sample had a mean full scale IQ (86.9) in the low average range. This was accounted for by the lower socioeconomic status of this sample compared to the normative sample of the WISC-R (Wechsler, 1974).

More recently, Siegel and Hopwood (1986) studied the intellectual functioning and academic achievement of 42 children with idiopathic growth hormone deficiency. Children were given the Wechsler Intelligence Scale for Children-Revised (WISC-R), the Bender Gestalt Test of Visual-Motor Integration, two subtests of the Wide Range Achievement Test (Reading Sight Word Recognition and Math), the Reading Comprehension subtest of the Peabody Individual Achievement Test (PIAT), and the Piers-Harris Self-Concept Inventory. Children were categorized as low academic achievers if either their combined reading standard score,

math standard score, or both were <85. Twenty-two of the 42 children were low achievers. The low achievers were then categorized into one of three psychometric profiles explaining academic failure:

1. Cognitive Deficit theory--at least one WISC-R scale score (VIQ or PIQ) falls within the average range (90-110); a V-P difference >18 points and/or a significant visual-motor integration deficit.

2. Low Ability theory--both VIQ and PIQ scale scores fall below the average range (<90).

3. Cognitive Underfunctioning--Low Self-Concept theory - both VIQ and PIQ scale scores fall within the average range; there is neither a significant V-P difference nor a significant visual-motor deficit.

The mean Verbal IQ of the growth hormone deficient group was 93.9. The mean Performance IQ was 94. Twenty-nine percent of the sample had a VIQ-PIQ discrepancy of >18 points in comparison to 16% of the normative sample (Kaufman, 1979). The mean self-concept score was higher than the mean of the standardization sample (X=60.2, %=75). Neither age at onset nor duration of growth hormone replacement treatment was significantly related to self-concept scores. Seventy-four percent of the low achievers had at least one cognitive atypicality (41%=low ability; 32%=cognitive deficit). Twenty-six percent of the children had significant visual-motor deficits. The authors conclude that while growth hormone deficient children have average cognitive functioning overall, they show specific problems: significant cognitive variability (high incidence of large VIQ-PIQ differences) and visual-motor integration difficulties.

Psychological Correlates: Growth Hormone Deficient Adults

Personality characteristics of growth hormone deficient children and adults have been studied. While the earlier work seems to be based on impressions, case studies, interview material, or projective testing, it is nonetheless a very interesting background from which to

begin a more methodologically sound investigation. For example, in a sample of growth hormone deficient adults Obuchowski and his colleagues (1970) found behaviors indicating childishness, jocularity and carelessness. On more in-depth analysis, the authors noted depression which they felt had been over-shadowed by well-developed defense mechanisms such as hypercompensation.

Brust, Ford, and Rimoin (1976) looked at the adjustment of 16 short statured adults--5 with growth hormone deficiency and 11 with achrondoplasia. Using interviews and some personality testing they found no significant differences between the two groups. Their subjects had generally achieved a satisfactory life adjustment despite their physical conditions. They seemed to have secure identities as "little people" and successfully used coping mechanisms such as a sense of humor or pleasant interpersonal style. Males tended to experience more emotional distress than females. The authors concluded that these short statured adults were psychologically well-adjusted and confident and generally lacked psychiatric symptoms, excessive anxiety, and depression.

More recently, Mitchell and colleagues (Mitchell, Johanson, Joyce, Libber, Plotnick, Migeon, & Blizzard, 1986) assessed the self-esteem and social, educational, and vocational status of 58 growth hormone deficient adults (ages 16 to 46 years) who had previously been treated with human growth hormone. The average was 26 years and the average final height was 5'2". Most of the subjects reported average or above average academic performance and satisfaction with employment status. In terms of self-concept, the growth hormone deficient adults rated themselves as lower than norms on physical self and self-criticism, but higher on self-satisfaction, personal worth, and sociality. Both heterosexual and same sex relationships were rated as inadequate. Forty-three percent were married and 59% of the married subjects had children.

A follow-up assessment of 116 growth hormone deficient adults who had been treated with human growth hormone was also done recently in Canada (Dean, McTaggart, Fish, & Friesen, 1986) where growth hormone has been distrubuted and clinical data collected centrally since 1967. While these subjects generally grew with human growth hormone treatment, post-treatment their average height remained 3 standard deviations below the mean height of children their same age and sex. These adults showed a high rate of unemployment (35%) and never having been married (85%). Of the 96 subjects who had completed formal education 73% lived with their parents. Only 58% had a drivers' license and 21% had received psychological counselling at some point. All of these factors combined indicate the less than satisfactory adjustment of these growth hormone deficient adults. Impairment in heterosexual relationships and activities was also found by Money, Clopper, and several associates in groups of adult males with hypopituitarism of various diagnoses (Money & Clopper, 1975; Clopper, Adelson, & Money, 1976; Money, Clopper, & Menefee, 1980). However, in a sample of 39 growth hormone deficient adults who had previously been treated with growth hormone, Clopper and colleagues (Clopper, MacGillivray, Mazur, Voorhess, & Mills, 1986) found somewhat more adequate adult adjustment. Only 8% of the subjects were unemployed, 95% completed high school and 70% of these completed further education. The sample as a whole reported spending an average of 55% of their free time with at least one other person. Nonetheless, 67% were still living with their parents and only 10% were married. Half of the sample reported current juvenilization by others and only 44% were satisfied with their physical appearance.

Psychological Correlates: Growth Hormone Deficient Children

Similar to the early psychological investigations of growth hormone deficient adults, the early work with children tended to utilize case studies, interviews, and projective testing.

Krims (1968) found a tendency toward psychological infantilism in his sample of 12 growth hormone deficient children aged 4 to 15 years. He noted that the reaction of the child and his environment to the perception of his extreme shortness was progressive, becoming worse as the child ages. Boys face more psychological difficulties than girls, he felt, particularly in adolescence when issues of role identification and occupational choice become relevant. The short child may experience feelings of being unacceptably different, inadequate, and incompetent. Sadness and grief may result.

Spencer and Raft (1974) outlined typical adaptive maneuvers and defense mechanisms used by short statured individuals who are often subject to infantilization by others. In reaction to failure to keep pace with their peers in terms of growth, the short statured child may withdraw socially and avoid competition with peers, particularly during adolescence. Conversely, he may react with overt aggression. Spencer and Raft felt that these adolescents might not be able to complete the normal tasks of adolescence such as formation of sexual and work identities. Instead, the stresses encountered during adolescence may cause a return to an earlier ("pre-genital") level of adaptation.

Further personality research on short statured children has been conducted by Steinhausen and Stahnke (1976, 1977). They looked at intelligence and other psychological variables as a function of age, sex and socioeconomic status in 16 short statured children without endocrine disorder as compared to normal controls. There were no differences between short children with or without endocrine disorder. Compared to normals, short statured children (regardless of etiology) did poorly on tests of spatial orientation and speed of closure but were not different from normals on other intellectual factors or general intelligence. Personality-wise the short children were less aggressive, less excitable, less dominant, more conscientious, less shrewd, more controlled and less tense than normal controls. From these findings Steinhausen and Stahnke depicted the short statured child as

living in a secluded inner world of intensified feelings, sentiment, and emotions, withdrawn and unsociable. Age, sex and socioeconomic status were not important factors in the results.

In another study (Drotar, Owens, & Gotthold, 1980) 16 growth hormone deficient children were compared to 16 normal height children on general adjustment (as measured by the Missouri Children's Picture Series; Sines, Parker, & Sines, 1971), body image, sex role development, sex-related fantasy, and reactions to frustration. The two groups were different only in their reactions to frustration. The growth hormone deficient children used less adaptive, mature solutions to frustrating situations than did the normal height children.

Self-Concept

Several researchers have looked at self-concept in growth hormone deficient children. Apter and his associates (1981) studied adolescents with combinations of pubertal delay and growth retardation. They found that the presence of delay in sexual maturation by itself had no significant negative effect on self-image. Both males and females showed self-concept differences according to height in the areas of family relationships, external mastery, superior adjustment, social relations, and moral attitues. Due to the negative effects on self-image of growth retardation, the authors endorced speeding up growth where appropriate in order to avoid these psychological difficulties.

Self-concept and emotional stability were studied by Shurka and her colleagues (1983) in four groups of growth retarded subjects with different diagnoses. Groups of subjects with high immunoreactive growth hormone deficiency, craniopharyngioma and pan-hypopituitarism had low self-concepts and high levels of emotional problems. Subjects with isolated growth hormone deficiency were emotionally stable and had self-concepts similar to normals. The authors accounted for the differences between the groups by the fact

that the isolated growth hormone deficient subjects have the potential for adequate medical treatment to alleviate their condition and the other three groups do not.

Treatment with Human Growth Hormone: Psychological Correlates

When growth hormone deficient children were treated with human growth hormone, a number of questions arose concerning their psychological adjustment. For example, Pollitt and Money (1964) asked whether the physical benefits from growth hormone treatment would motivate improved school achievement in underachieving short statured children. What effect does this treatment have on psychological adjustment? Krims (1968) noted that some short statured children reported intense unhappiness only after growth hormone treatment started and they began to grow.

Even with adequate growth, feelings of inadequacy and incompetency may remain. Brust, Ford, and Rimoin (1976) noted the presence of a range of difficulties in accepting treament. These varied from feelings of pressure to perform better to outright refusal to be treated. These responses were explained by the authors as due to an identity crisis brought about by the prospect of change from a familiar situation (i.e., short stature). Others faced with treatment showed decreased denial and immature behavior coupled with increased overt depression and anger.

Money and Pollitt (1966) studied 17 short statured patients under treatment with human growth hormone. Based on interview and observation they described a "readjustment syndrome":

> . . . the patient's ill health represents a chronic state of disability to which he has been long accustomed. In this instance, therapeutic intervention brings about changes in corporeal self and the expectancies of life experience. Such rapid change toward normalcy may be as difficult to adjust to as a deforming injury or

> other rapid departure from normalcy. (Money & Pollitt, 1966, p. 387)

They suggest that this readjustment syndrome can be avoided if hormonal treatment is begun very early in life before the child has had to adjust to life as an extremely short child.

The psychological status of a group of 11 children being treated with human growth hormone was documented over the course of 2-1/2 years by Kusalic and Fortin (1975). The status of these children changed over the course of treatment from immaturity, low self-esteem and lacking aggressive impulses pretreatment as compared to normals to depressed, apathetic and verbally aggressive after 2 1/2 years. Each treatment involved a 6 month series of injections followed by a 6 month rest period. According to projective testing pretreatment, the children were psychologically immature as compared to a normal population. They had low self-esteem and showed a lack of aggressive impulses. The overall impression was one of distress and dejection. After the first treatment low self-esteem became the main feature of their psychological make-up. Aggressive drives began to be manifested in the children's fantasies. After the second treatment immaturity was still present but depression shown most clearly in low self-esteem was even more prominent. Aggressive drives were evident in occasional verbal discharges.

After the third treatment low self-esteem remained and depression became manifested more in affective withdrawal. Aggressive drives appeared to increase in direct proportion to changes in the patient's height. After the fourth treatment immaturity was still present but even more evident was low self-esteem and a state of helplessness and emotional detachment. At this point some patients seemed to regress. After the fifth treatment the group as a whole remained depressed and apathetic but verbally aggressive. Any regression previously exhibited became even more pronounced.

All of the patients in the Kusalic and Fortin (1975) study reportedly had unrealistic hopes of obtaining normal height. Additionally 9 of 11 families showed a high degree of

pathology. There were parental schism and ambivalent, over-protective, covertly-rejecting parental attitudes toward the short child. These pathological attitudes increased over the course of treatment. In this sample 8 of 22 parents showed a marked psychiatric disorder. Kusalic and Fortin concluded that this is a group of vulnerable children at very high risk for psychological problems. The older the patient the longer he has been exposed to the feelings of low self-esteem associated with small size and the less able he is to adjust to the change brought about by growth hormone treatment. The authors found that the younger the child at the beginning of treatment the better the subsequent adjustment. Also, girls tended to have fewer adjustment problems during treatment.

Rotnem and her associates (1977, 1979) also followed the personality and social development of a group of growth hormone deficient children being treated with human growth hormone. Projective testing indicated that the majority of the children saw themselves as socially isolated, powerless, vulnerable, incompetent, and suffering from low self-esteem. These feelings were related to repeated instances of social rejection or failure to reach goals. The children also showed inhibition of aggression. They tended to be hypersensitive to criticism, anticipated rejection, increasingly based their self-esteem on the opinions of others and felt hopeless and empty.

Parents of these children tended to be overprotective, showed excessive control, and underestimated the emotional and developmental difficulties encountered by their children. After one year of treatment the children tended to regard their treatment as a relative failure even though their rate of growth was increased over baseline levels. This may be attributed to unrealistic expectations for growth with treatment. Emotional reactions to the perception of treatment failure included anger, pessimism, guilt, negativism and feelings of unacceptability.

Grew and his associates (1983) developed a visual technique to measure expectations of growth in children treated with human growth hormone. They then introduced an educational

program aimed at altering family members' unrealistic expectations of growth from human growth hormone replacement therapy. Almost 45% of growth delayed children and their families overestimated their height relative to peers. Approximately 80% of the short children had unrealistic expectations of the results of growth hormone therapy. After an intervention composed of feedback, clarification, reframing and redirecting of ideas about treatment, more subjects who had received intervention than those who had not accurately estimated the short child's future height.

Behavioral Adjustment

At least two groups of researchers within the last few years have conducted research on short statured children using sound research methods and measures with proven validity and reliability. This is in contrast to most of the research previously cited which has been in large part based on case studies, anecdotal reports, or projective measures.

Gordon and his group (1982) looked at 24 short statured children aged 6 to 12 years with constitutional delay of growth. This group was compared to a group of 23 normal height children matched for age, IQ, sex, and socioeconomic status. Parents filled out Achenbach's (1979) Child Behavior Checklist and objective measures of family functioning and child-rearing attitudes as well as providing interview material. Children completed the Piers-Harris Self-Concept Scale (Piers, 1969). The short statured and normal height groups were not significantly different on social competence factors indicating similar school performance and involvement in activities. The groups were significantly different, however, on the behavior problem index, particularly with regard to somatic complaints, schizoidal tendencies and social withdrawal. Scores for the short children were so high they approached the level typically found in children referred for psychological evaluation.

Parents of the constitutional short statured children appeared to be less strict in child-rearing than parents of normal height children. On the self-concept measures the short children tended toward lower scores. They more often described themselves as unhappy and unpopular. There was no relationship between the height deficit of the child among short statured children and the amount of psychopathology or impaired self-esteem. Age and sex of the child did not affect the results in any systematic fashion. From this pattern of results the authors concluded that constitutionally short statured children have significantly more behavior problems and lower self-esteem than a matched group of normal height children. The short children seemed to be socially withdrawn and aloof and tended to express their emotional concerns internally.

A group of 27, 8 to 15 year old short statured children with either growth hormone deficiency, constitutional delay, or short stature of unknown etiology was studied by Young-Hyman (1986). Parents and the children themselves served as the respondents. Children with earlier onset of growth delay tended to have more friends and longer-standing relationships. However, children with greater growth delay tended to have fewer friends and shorter relationships.

Holmes, Hayford, and Thompson (1982a, 1982b) have published two investigations of the behavioral adjustment of short statured children. One of these studies (1982a) compared the personalities and behavioral functioning of constitutionally delayed and growth hormone deficient boys. Parents completed the Achenbach (1979) Child Behavior Checklist and children were given the Missouri Children's Picture Series (Sines, Parker & Sines, 1971), a nonverbal empirically derived measure of personality for 5 to 16 year olds. Results did not differentiate the children based on diagnosis. Parents rated older boys as showing more obsessive/compulsive behaviors and less aggressive behaviors than younger boys. The children's results indicated that older boys are more conforming and inhibited. Altogether the

pattern of results shows this group of boys to be more withdrawn than boys of normal height regardless of age.

The role of age and sex in the behavioral adjustment of short statured children was also studied by Holmes, Hayford, and Thompson (1982b). Three groups of 6 to 16 year old children were included with differing diagnoses: constitutionally delayed, growth hormone deficient or Turner's syndrome. Parents rated the children on the Achenbach (1979) Child Behavior Checklist while teachers used the Quay and Peterson (1979) Behavior Problem Checklist. Adolescent girls were rated by both teachers and parents as showing the greatest degree of behavioral immaturity, emotional inhibition and school problems of the groups studied. Significant school problems were noted on parent ratings for all groups except for younger constitutionally delayed children. Teachers rated all of the children as showing a relatively high incidence of immature/inadequate behaviors except the adolescent males. There were also indications of significant amounts of peer teasing. Additionally, 25% of the subjects had been retained sometime in kindergarten through second grade, possibly due to small size and immaturity. Drash (1969) also noted that short statured children are often held back in school for these reasons. He felt this might have more of a negative effect on their social development than a positive one as they will not catch up in growth within one year.

In a later study Holmes, Thompson, and Hayford (1984) looked at factors that might be related to grade retention in their sample of short statured children. All of the children were of at least average intelligence upon initial testing. Despite repeating a grade level in the primary grades, the retained children continued to function 6 months below grade expectation according to both teacher and parent ratings as well as a standardized achievement test.

Forty-seven of the children reported on by Holmes and her group in 1982 were re-evaluated approximately three years later (Holmes, Karlsson, & Thompson, 1986). According to parental ratings, the children showed an age-related decline in adjustment during

the early years of adolescence (beginning at approximately 12-14 years). Ratings of school and social competence were about one standard deviation below the mean during these years. Both before and after these years school and social functioning were rated by parents near the 50th percentile. By approximately 17 years of age both school and social competencies are near age expectancy. As in the previous report (Holmes et al., 1982b) older females showed more school problems than did other age/sex groups. While this is a report over only 3 years, the findings point to the need for longitudinal research into the adjustment of growth hormone deficient children.

Summary

From this review of the literature relevant to the psychosocial adjustment of growth hormone deficient children it is apparent that there has not been much research done using reliable, valid measures, adequate controls and relatively large samples. Notable exceptions are the studies of Holmes, Hayford, and Thompson (1982a, 1982b). There is also a lack of research from a multivariate perspective.

The general picture of the growth hormone deficient child that emerges from the literature to date is one of an immature, socially withdrawn child with a low self-concept who has significant school problems despite at least average intelligence. The possibility of an increased growth rate with growth hormone therapy (previously human growth hormone, currently synthetic growth hormone) may cause initial optimism but may also result in unrealistic expectations for ultimate height. When this height is obviously not being reached, the child may respond by developing an even lower self-image and allowing release of previously inhibited aggressive behavior.

One or two of the previous studies have looked at self-concept in growth hormone deficient children (Apter et al., 1981; Shurka et al., 1983). Several studies have adequately

looked at adjustment using parent and/or teacher ratings of the short statured child's behavioral functioning on some relatively objective inventory such as Achenbach's (1979) Child Behavior Checklist (i.e., Holmes, Hayford, & Thompson, 1982a & 1982b). Teasing and social relations seem to be very important issues in the adjustment of the growth hormone deficient child. Therefore it is rather suprising that no one has investigated the short statured child's sociometric status within his classroom.

Present Study

The present study was designed to address several questions. The first question concerned the sociometric status of the growth hormone deficient child (being treated with growth hormone) within his classroom. The second question concerned the correspondence between perceptions of the child's "adjustment" from four different sources--both parents, teachers, peers, and the child himself. Behaviors of particular importance were aggression and social withdrawal. The review of the previous literature in this area indicates that these two behavior problems may be particularly prevalent in growth hormone deficient children receiving growth hormone replacement treatment. The last question concerned the relationship between the behavioral adjustment of the growth hormone deficient children and how realistically they perceive their present height in relation to other children of the same age and sex.

It was predicted that growth hormone deficient children would be viewed relatively more negatively than their peers on sociometric ratings. It was also predicted that the perceptions of the children's adjustment from the four different sources--parents, teachers, peers, and the children themselves--would be moderately correlated. Previous research has suggested that children's self-reports may show the poorest correspondence with the other measures (Ullman, 1952; Powell, 1948; Cox, 1966). It was also predicted that

correspondence between these raters will be different for the growth hormone deficient children and the normal height children. Correspondence between ratings of the growth hormone deficient children could be more accurate than those of normal height children due to a tendency to be more attentive to the behavior of a child with a chronic medical condition. Lastly, it was predicted that growth hormone deficient children who have unrealistic perceptions of their height will be rated as more maladjusted than short statured children with more realistic perceptions. Previous research has shown associations between inaccurate perceptions of one's height and growth rate and a number of problem behaviors from social withdrawal to aggression (i.e., Kusalic & Fortin, 1975; Rotnem et al., 1979).

CHAPTER II
METHOD

Subjects

Subjects were 45 growth hormone deficient children who were patients in the Pediatric Endocrinology Clinic of Shands Teaching Hospital, the University of Florida, Gainesville. All were currently receiving human growth hormone replacement treatment. Duration of this treatment was from less than 1 year to more than 13 years.

A control group of 40 nongrowth hormone deficient children consisted of children who were either volunteers from the growth hormone deficient child's class, or in the absence of volunteer classmates, were volunteers from the University of Florida Laboratory School.

Measures

Child Behavior Checklist

While the entire Child Behaivor Checklist was completed by informants, only several of its scales were used in this investigation. Each of the three social competence scales on the parent version were utilized. Total behavior problem scores were used from all versions, but the only behavior problem scales used were social withdrawal and aggression. These two behavior problems have been reported to be of particular relevance in this population.

This measure is designed to assess the behavioral problems and competencies of children aged 4 to 16 years (CBCL; Achenbach & Edelbrock, 1983). It consists of 113 behavior problem items rated as either "not true," "somewhat or sometimes true" or "very true or often true." Separate forms are available for parents, teachers, and children (11-16 years of age).

The CBCL yields scores on 3 social competence scales as well as several behavior problem scales, second-order factors, and total behavior problem and social competence scores. The separate scales are plotted in profile form using T-scores. The particular scales vary on the different forms according to age of the child in question. The parent form consists of scales measuring behavior characterized as schizoid or anxious, depressed, uncommunicative, obsessive-compulsive, somatic complaints, social withdrawal, hyperactive, aggressive, and delinquent. The teacher form has scales measuring behavior described as anxious, socially withdrawn, unpopular, self-destructive, obsessive-compulsive, inattentive, nervous-overactive, and aggressive.

Agreement between ratings by mothers and clinicians averaged 83% for the internalizing/externalizing factors and 74% for the lower level profile types (see Achenbach & Edelbrock, 1983). The internalizing/externalizing factors were determined through factor analysis of the behavior problem scales. The 1 week test-retest reliability for the internalizing factor is 0.82, and for the externalizing factor is 0.91 (Achenbach & Edelbrock, 1983). The internalizing factor correlates 0.58 with the anxiety scale from the Conners Parent Questionnaire and 0.62 with the psychosomatic scale, while the externalizing factor correlates 0.45 with the impulsive/hyperactive scale and 0.77 with the conduct problem scale (Achenbach & Edelbrock, 1983).

One week test-retest reliability for the total social competence scores is 0.89 (Achenbach & Edelbrock, 1983). In terms of content validity, clinically-referred children received lower scores on all social competence items (Achenbach & Edelbrock, 1983).

The Youth Self-Report Form (YSRF) has not yet been factor analyzed to produce separate factors. Instead, a total behavior problem score is derived. Test-retest reliability over 6 months for this total behavior problem score is 0.69 (Achenbach & Edelbrock, 1983). In terms of validity, the total behavior problem score has correlated 0.55 with

clinician-rated behavior problem scores (Achenbach & Edelbrock, 1983). While social competence items are included in the YSRF, they have not as yet been normed.

Pupil Evaluation Inventory

This peer rating measure (Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976) consists of a matrix with 35 items down the left hand column and the name of each pupil in a given classroom along the top of the page. Each child then checks which classmates he feels are described by a particular item. Three factors account for 65% of the variance in scores (Pekarik et al., 1976). They are Aggression, Withdrawal and Likeability. Item scores are the sum of endorsements on a particular item for a given child. These are then divided by the number of raters to facilitate intergroup comparison. An individual's score on a factor is derived by averaging the previously obtained percentages for all items significantly loading on that factor.

Test-retest reliability over two weeks ranged from 0.81 to 0.95 for the different factors with both male and female raters. Looking at individual items, the median test-retest correlations for male and female raters were 0.71 and 0.76, respectively (Pekarik et al., 1976).

Teacher and self-ratings were correlated with peer ratings as a measure of concurrent validity (Pekarik et al., 1976). The teacher-peer rating correlations ranged from 0.28 to 0.73 with a median of 0.57. The self-peer rating correlations ranged from 0.09 to 0.59 with a median of 0.39. Correlations within each of the factors for teachers and peers were 0.65, 0.53, and 0.52 for Aggression, Withdrawal, and Likeability, respectively. For self-peer comparisons the correlations were 0.46, 0.39, and 0.27.

Positive/Negative Peer Nomination Inventory

This instrument requires each pupil in a classroom to indicate the three classmates he likes the most and the three he likes the least. These scales were considered separately. The

number of nominations for each was divided by the total number of children completing the form to yield a percent score. This facilitated comparison across classrooms with different numbers of students.

The median of test-retest reliability coefficients from Kane and Lawler's (1978) review of such techniques was 0.78. They account for such a high reliability by the method's focus on nominations of extreme members (3 liked most, 3 liked least). Hollander (1956) showed that reliability seems to develop early in the life of a group. The median criterion validity coefficient from the Kane and Lawler (1978) review was 0.43. Criteria included graduation, promotion, and judgment of superiors.

Piers-Harris Self-Concept Scale

This measure of children's self-image (Piers,1969) consists of 80 first person statements. The child circles "yes" or "no" for each item indicating whether he considers it true for him. It was standardized on 1,183 children in grades 4 through 12. A factor analysis accounting for 42% of the variance yielded at least 6 factors - behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction. An overall self-concept measure for each child was obtained as were the 6 factor scores.

Test-retest reliability over both a 2 and a 4 month interval was 0.77 for 244 fifth graders (Wing, 1966). Concurrent validity has been investigated by comparing Piers-Harris scores with scores from other similar measures. When compared with scores on Lipsitt's (1958) Children's Self-Concept Scale for 98 special education 12 to 16 year old students (Mayer, 1965), a correlation of 0.68 was obtained.

Reliability and validity coefficients are not reported for the six factors. It is recommended that they be used primarily as research instruments (Piers, 1969).

It is important to note here that children may respond to the Piers-Harris Self-Concept scale with a "social desirability" mindset. Millen (1966) found a correlation from 0.25 to 0.45 between this scale and the Children's Social Desirability Scale (Crandall, Crandall, & Katkovsky, 1965).

Children's Social Desirability Scale

This is a 47 or 48 item inventory (CSD; Crandall, Crandall, & Katkovsky, 1965) consisting of questions to which a child responds by circling either "yes" or "no" indicating whether the question is true for him. The form for children in grades 6 and above contains one more item than the form for younger children. An overall social desirability score was obtained for each child. The CSD was developed by simplifying the language of items from the Crowne-Marlowe (1960) Social Desirability Scale.

The scale was standardized on 956 students in grades 3 through 10. Test-retest reliability (Crandall, Crandall, & Katkovsky, 1965) was 0.63 over a one month interval. In terms of validity, CSD scores correlated 0.51 with the Good Impression scale from the California Personality Inventory (Crandall, Crandall, & Katkovsky, 1965).

Silhouette Apperception Test-Revised

The Silhouette Apperception Test (Grew, Stabler, Williams, & Underwood, 1983) was revised for the present study. The measure that was used consisted of a question which was answered by circling one of five human silhouettes. The silhouettes were arranged in increasing order of height from the third to the ninety-fifth percentile. The question was:

> Children grow at different rates. These children are all the same age. Which child looks the most like you? (The child was told that the children were his same age and sex.)

Each growth hormone deficient child completed this form. A similar form asking for opinions about the child in question was filled out by the physician assistant who worked closely with all of these children. She was aware of the child's actual height percentile for age and sex, as

well as the child's bone age, height age, and growth rate. An index of how realistic the children's perceptions were concerning their present height was derived. Each silhouette was assigned a number from 1 to 5 in order of increasing height. The child's rating was subtracted from the physician assistant's rating. Therefore realism ratings could vary from -4.0 to +4.0.

Attractiveness Ratings

Two Polaroid pictures of each child were taken--one of the child's face and the other of the child's entire body in order to indicate height. The pictures were rated for attractiveness on a scale from 1 (not at all) to 5 (very) by students in similar grades in schools in Jackson, Mississippi. The attractiveness rating for any particular picture was the average of the ratings given to that picture by all of the students in one classroom. Therefore these ratings could vary from 1.0 to 5.0.

Peabody Picture Vocabulary Test

This measure of receptive vocabularly (Dunn & Dunn, 1981) consists of 150 plates roughly ordered in increasing difficulty. The subject's task is to identify which of four pictured alternatives matches the word spoken by the examiner. This test was used as a global estimate of intelligence.

The median split-half reliability coefficients were 0.80 and 0.81 for Form L and Form M, respectively. In terms of criterion validity, the median correlation between the PPVT and 10 different vocabulary tests was 0.71 (Dunn & Dunn, 1981). Median correlations with the Verbal and Full Scale scores of the Wechsler Intelligence Scale for Children-Revised were 0.71 and 0.72, respectively (Dunn & Dunn, 1981).

Procedure

Children were given the Peabody Picture Vocabulary Test (PPVT; Dunn, 1965) either in clinic, at home, or at school.

Questionnaires were filled out by both parents and children at home and mailed to the experimenter.

The experimenter visited each child's school to administer the peer rating measures. Schools were located from Miami to Pensacola, Florida, to Valdosta, Georgia. Children in grades 2 through 11 completed both the Peer Nomination Inventory and the Positive/Negative Peer Nomination Inventory. Children in kindergarten and first grade completed only the Positive/Negative Peer Nomination Inventory as they were unable to read the Pupil Evaluation Inventory. In several other cases only the Positive/Negative Peer Nomination Inventory or only the positive nomination portion of that inventory were administered at the request of the school principal or county research committee.

Additionally, two pictures were taken of each child to be used to obtain attractiveness measures. One picture of each child showed only his face, the other the entire child standing against a door to indicate his height. These pictures were rated for attractiveness on a 5-point scale by children in similar grade classrooms in Jackson, Mississippi.

Teachers were given their questionnaires at school and provided with a stamped envelope in which to return them.

The physician assistant who worked closely with the growth hormone deficient children completed a Silhouette Apperception Test-Revised concerning each child concurrent with their being seen in the clinic.

CHAPTER III
RESULTS

Sample sizes vary in the different analyses due to several factors. These factors include: fewer fathers and teachers participated than mothers; only adolescents completed the Youth Self-Report Form; some schools did not allow the peer rating measures to be administered; and children in kindergarten and first grade did not complete the Pupil Evaluation Inventory.

Characteristics of the Sample

Characteristics of both the growth hormone deficient and non-growth hormone deficient children are shown Table 1. The growth hormone deficient sample was 60% male and 40% female. The average age of the growth hormone deficient children was 12.2 years, ranging from 5 to 20 years. Seventy-one percent were white, 16% were black, and 13% were hispanic. The mean grade level was 5.8 with a range from kindergarten through grade 12. PPVT scores ranged from 61 to 148 with a mean of 92.8.

The control group was 58% male and 42% female. The average age of the control subjects was 11.4 years, ranging from 5 to16 years. Eighty-three percent of the children in the control group were white and 17% were black. The mean grade level was 5.5 with a range from kindergarten though grade 11. PPVT scores ranged from 48 to 146 with a mean of 104.9.

The two groups were significantly different on PPVT scores ($t=3.12$, $p<.01$). The mean of the growth hormone deficient group was significantly lower then the mean of the control group 92.8 (S.D.=18.6) versus 104.9 (S.D.=16.1).

Chi square analyses were done on a number of demographic variables to determine if they varied between the two groups. There were no differences between the groups on income ($chi^2=8.76$, $df=5$, $p.>05$), sex ($chi^2=0.05$, $df=1$, $p>.05$), and marital status ($chi^2=4.78$, $df=4$, $p>.05$).

TABLE 1
Sample Characteristics

	Growth Hormone Deficient Children (n=45)	Control Children (n=40)
Age:	X=12.2 (5-20)	X=11.4 (6-16)
Sex:	M=60% F=40%	M=58% F=42%
Race:	White= 71% Black= 16% Hispanic=13%	White=83% Black=17%
Income:	$ 0 - 9,000= 6% 10-19,000=52% 20-29,000=16% 30-39,000=10% 40,000+ =16%	$ 0 - 9,000= 0% 10-19,000=23% 20-29,000=27% 30-39,000=20% 40,000+ =30%
Parental Marital Status:	Married=74% Other=26%	Married=84% Other=16%
Grade Level:	X=5.8 (K-12)	X=5.5 (K-11)
Grades in School:	A's & B's=14% B's & C's=60% C's & D's=23% D's & F's= 3%	A's & B's=55% B's & C's=35% C's & D's= 7% D's & F's= 3%
Repeated a Grade in School:	yes=43% no=57%	yes=10% no=90%
Peabody Picture Vocabularly Test:	X=92.8 (61-148)	X=105.1 (48-146)

The two groups were different, however, on race (chi^2=10.97, df=3, p<.01). The groups contained essentially the same percentages of black subjects (16% vs. 17% for the growth hormone deficient and control children, respectively). The remainder of the control subjects were white (83%). The remainder of the growth hormone deficient sample was 71% white and 13% hispanic. There were also differences between the groups on two school-related indices. The two groups were significantly different on what kind of grades they were currently making in school (chi^2=13.07, df=4, p<.005). The growth hormone deficient children were making more B's, C's, and D's than the control children who were making more A's and B's. Significantly more of the growth hormone deficient children had also repeated a grade level at some point (chi^2=8.78, df=2, p<.01).

Height of the Growth Hormone Deficient Children

The mean height percentile for age and sex in the growth hormone deficient (GHD) children was 5.1% (n=40) with a range from 1% to 50% and a standard deviation of 3.1%.

Since the age range of the GHD sample is so broad an average height for the total sample would not provide useful information. Instead, Table 2 shows the average height for each sex in small age ranges. In only one of the 11 age ranges does the mean for the range fall on the growth curve (8-10 year old girls, mean at the 5th percentile). The means of the other age ranges are all below the fifth percentile for age and sex.

Comparison of the Control Subjects from the Growth Hormone Deficient Subjects' Classrooms and Those Who Were Not

The control subjects from the same classrooms as the growth hormone deficient subject's classrooms (n=22) and the control subjects from the laboratory school (n=18) were compared on all adjustment measures using analysis of variance (ANOVA) or multivariate analysis of variance (MANOVA). As indicated in Table 3 the two groups were not

TABLE 2
Mean Height for Age and Sex of the
Growth Hormone Deficient Group

Girls		Boys	
Age (years)	Mean Height	Age (years)	Mean Height
6-8	3' 4 1/2" (<5th percentile)	6-8	3' 7" (<5th %tile)
8-10	4' 0" (at 5th %tile)	8-10	3' 8 1/2" (<5th %tile)
10-12	3' 8" (<5th %tile)	10-12	4' 0" (<5th %tile)
12-14	4' 0" (<5th %tile)	12-14	4' 4" (<5th %tile)
14 +	4' 6" (<5th %tile)	14-16	4' 10 1/2" (<5th %tile)
		16 +	5' 3" (<5th %tile)

TABLE 3
F Statistics Comparing Control Subjects from the Growth Hormone Deficient Subjects' Classrooms and Those from the Lab School on Each Dependent Measure

Dependent Variables	F value	df	p value
Child ratings:			
self-concept	0.16	1,29	>.05
behavior problems	1.10	1,19	>.05
Mother ratings:			
withdrawal aggression activity competence social competence school competence	1.19	5,21	>.05
internalization externalization	0.99	2,26	>.05
overall social competence total behavior problems	1.01	2,24	>.05
Father ratings:			
withdrawal aggression activity competence social competence school competence	1.98	5,17	>.05
internalization externalization	0.42	2,23	>.05
overall social competence total behavior problems	0.30	2,19	>.05
Teacher ratings:			
withdrawal aggression	2.35	2,14	>.05
internalization externalization	2.05	2,16	>.05

Table 3--continued.

Dependent Variables	F value	df	p value
Teacher ratings (cont'd.):			
grades appropriate behavior effort exerted amount of learning happiness	2.56	5,16	>.05
overall school competence	0.21	1,21	>.05
total behavior problems	1.94	1,18	>.05
Peer ratings:			
withdrawal aggression likeability	1.17	3,27	>.05
classmates liked most	0.17	1,38	>.05
classmates liked least	2.10	1,37	>.05

significantly different in any of these analyses. The two types of control subjects were also not significantly different on the PPVT (t (37)=1.36, p>,05). The mean PPVT score for the subjects from the GHD children's classrooms was 101.7 (s.d.=17.1); the mean for the laboratory school children was 108.7 (s.d.=14.5).

Comparison of the Growth Hormone Deficient Subjects with Idiopathic Growth Hormone Deficiency and Those with All Other Types of Growth Hormone Deficiency

The children who are growth hormone deficient as a result of tumors, infections, and other types of known insults (n=18) were compared to the remainder of the growth hormone deficient children (idiopathic GH deficiency; n=27) on all adjustment measures using analysis of variance (ANOVA) or multivariate analysis of variance (MANOVA). As indicated in Table 4 these two groups were not significantly different in any of these analyses. Table 5 shows the means of these two groups on several of the variables of interest.

Covariates: Miscellaneous Statistics

Social desirability was significantly related to child ratings of self-esteem (r=0.37, n=67 pairs, p<.01). Therefore it was used as a covariate in the analyses dealing with self-esteem.

Social desirability was not significantly related to behavior problem scores from the Youth Self-Report Form of the Child Behavior Checklist (r=0.23, n=44 pairs,p>.05). It was not used as a covariate for this set of analyses.

The growth hormone deficient and control groups were not significantly different on the social desirability measure (t(65)=1.36, p>.05). The means for the two groups, respectively, were 20.6 and 17.5.

Both attractiveness ratings, face and whole body, were significantly related to one of the sociometric factors, social withdrawal, on the Pupil Evaluation Inventory (face: r=-0.32, n=58, p<.05; body: r=-0.35, n=58, p<.01). Therefore, they were used as covariates in the

TABLE 4
F Statistics Comparing Growth Hormone Deficient Children with Idiopathic Growth Hormone Deficiency and Those with All Other Types of Growth Hormone Deficiency on All Dependent Variables

Dependent Variables	F value	df	p value
Child ratings:			
self-concept	1.94	1,33	>.05
behavior problems	1.44	1,21	>.05
Mother ratings:			
withdrawal aggression activity competence social competence school competence	0.89	5,27	>.05
internalization externalization	0.00	2,32	>.05
overall social competence total behavior problems	0.07	2,30	>.05
Father ratings:			
withdrawal aggression activity competence social competence school competence	0.90	5,18	>.05
internalization externalization	0.97	2,23	>.05
overall social competence total behavior problems	0.56	2,20	>.05
Teacher ratings:			
withdrawal aggression	1.21	2,27	>.05
internalization externalization	1.41	2,29	>.05

Table 4--continued.

Dependent Variables	F value	df	p value
Teacher ratings (cont'd.):			
grades appropriate behavior effort exerted amount of learning happiness	0.41	5,25	>.05
overall school competence	0.54	1,29	>.05
total behavior problems	1.18	1,30	>.05
Peer ratings:			
withdrawal aggression likeability	0.59	3,19	>.05
classmates liked most	0.70	1,34	>.05
classmates liked least	2.37	1,32	>.05

TABLE 5
Means and Standard Deviations of Several Variables
for the Growth Hormone Deficient Children with Idiopathic
Growth Hormone Deficiency and Those with All Other Diagnoses

	Diagnosis	
	Idiopathic (n=27)	All Others (n=18)
Age	12.6 (3.4)	11.6 (3.9)
PPVT	94.1 (21.6)	90.0 (13.4)
Child Ratings:		
self-esteem:	73.0 (16.7)	65.9 (18.7)
social desirability	20.1 (8.7)	21.2 (8.9)
total behav. probs.	43.4 (22.4)	56.6 (30.0)
Mother Ratings:		
aggression	63.9 (9.9)	60.7 (6.8)
withdrawal	60.1 (6.5)	58.4 (4.5)
total social competence	37.8 (10.1)	36.6 (7.8)
Father Ratings:		
aggression	61.3 (8.3)	59.1 (4.3)
withdrawal	57.2 (11.5)	57.0 (3.0)
total social competence	40.9 (11.3)	37.5 (9.1)
Teacher Ratings:		
aggression	62.7 (9.3)	59.0 (4.3)
withdrawal	56.7 (3.0)	55.5 (1.2)
effort	52.4 (7.5)	55.3 (8.1)
amt. learned	48.8 (11.4)	49.2 (9.6)
Peer Ratings:		
aggression	13.4 (9.3)	14.2 (11.5)
withdrawal	17.6 (11.2)	25.8 (12.5)
likeability	26.1 (17.6)	22.5 (18.3)
liked most	11.1 (10.7)	8.3 (8.8)
liked least	8.6 (9.8)	15.1 (15.2)

analyses dealing with the Pupil Evaluation Inventory. Neither of the attractiveness ratings was significantly related to nominations of peers liked the most nor peers liked the least. Therefore, they were not used as covariates in analyses dealing with these variables. Table 6 shows the correlations between the sociometric and attractiveness ratings.

The growth hormone deficient and control groups were not significantly different on either of the attractiveness ratings. A multivariate analysis of variance (MANOVA) was used to compare the two groups on the attractiveness ratings ($F(2,77)=0.73$, $p>.05$).

Ratings by Each Source

Either analysis of variance (ANOVA) or multivariate analysis of variance (MANOVA) was used to compare the growth hormone deficient children and nongrowth hormone deficient children on ratings by each source. Age (divided at the overall mean: <12 years versus >12 years), sex, score on the Peabody Picture Vocabulary Test (divided at the overall mean: <98 versus >98), and interactions involving group (growth hormone deficient versus control) and each of these separate factors were initially included in each model. Any of these factors which were nonsignificant were dropped from the model. They will be discussed only where they made significant contribution to the model. Therefore, unless specifically stated, analyses will involve only the factor Group (growth hormone deficient [GHD] versus control).

The number of subjects included in each of the following analyses varied depending on the number of respondents in the particular area in question. All figures indicate the number of cases included in each analysis.

Ratings by the Child

Scores on the Children's Social Desirability Scale (CSD) were used as a covariate in the two analyses of child's self-report of self-esteem, both total score and separate scales from the Piers-Harris Self-Concept Scale. The two groups were significantly different on total self-esteem scores from the Piers-Harris Self-Concept Scale ($F(1,64)=7.51$, $p<.01$). The

TABLE 6
Correlations between Peer Ratings
and Attractiveness Ratings

	Attractiveness Rating	
Peer Rating	Face	Full Body
PEI:		
Aggression	-0.02 (n=58)	0.02 (n=58)
Withdrawal	-0.32 (n=58)*	-0.35 (n=58)**
Likeability	0.10 (n=58)	0.15 (n=58)
Peer Nomination Inventory:		
Classmates Liked Most	0.05 (n=75)	-0.01 (n=74)
Classmates Liked Least	-0.00 (n=72)	-0.13 (n=71)

*=p<.05
**=p<.01

mean of the GHD group ratings was relatively lower than that of the control group. The mean of the control group was rather high, however, compared to the norms (Piers, 1969).

The groups were not significantly different on a comparison of self-ratings on the six separate scales from the Piers-Harris ($F(6,56)=1,46,p>.05$) with social desirabiity taken into effect. The differences found on the analyses of self-esteem are depicted in Figures 1 and 2. The figures show differences in the actual means.

There was a Group X PPVT interaction on total behavior problem scores from the Youth Self-Report Form of the Child Behavior Checklist ($F(1,40)=4,30,p<.05$). Figure 3 shows this interaction. While the GHD and control group means are similar for subjects with higher PPVT scores, means for the two groups are very different for subjects with lower PPVT scores. GHD children with lower PPVT scores rated themselves as having significantly more (frequency and/or severity) behavior problems than control subjects with lower PPVT scores.

Ratings by Parents

All ratings of adjustment by mothers and fathers are from the Child Behavior Checklist (CBCL) and involve T scores. Ratings by mothers and fathers were analyzed separately. For each parent's ratings, three multivariate analyses of variance were conducted. The first analysis looked at scores from individual scales chosen because they were found to be of particular relevance in this population--two behavior problem scales (withdrawal and aggression) and three social competence scales (activities, social involvement, and school). The second analysis looked at the second-order behavior problem factors of internalizing and externalizing. The third analysis included both the overall behavior problem score and the overall social competence score.

Ratings by Mothers

The first analysis of the five individual scales was significant overall ($F(5,54)=8.99$, $p<.001$). Separate ANOVAs indicated that the two groups were significantly different on

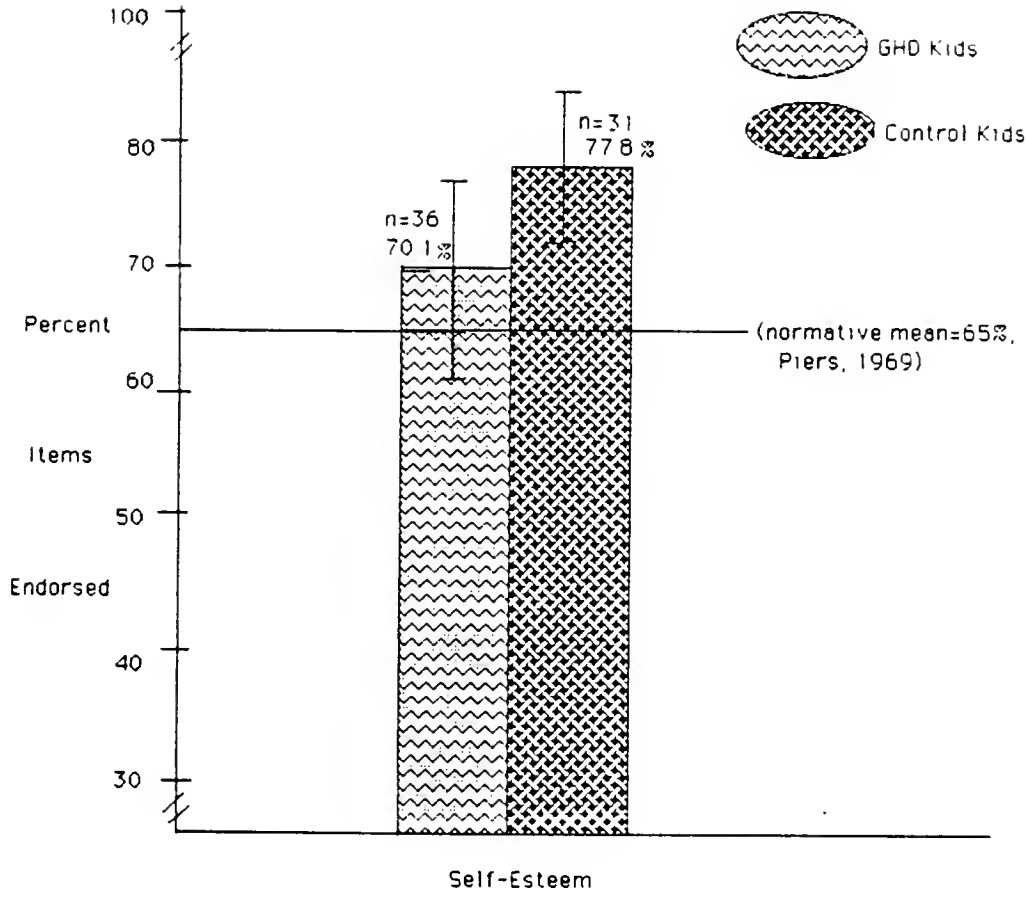

FIGURE 1. Mean ratings by children: Self-esteem total.
(Actual means are depicted.)

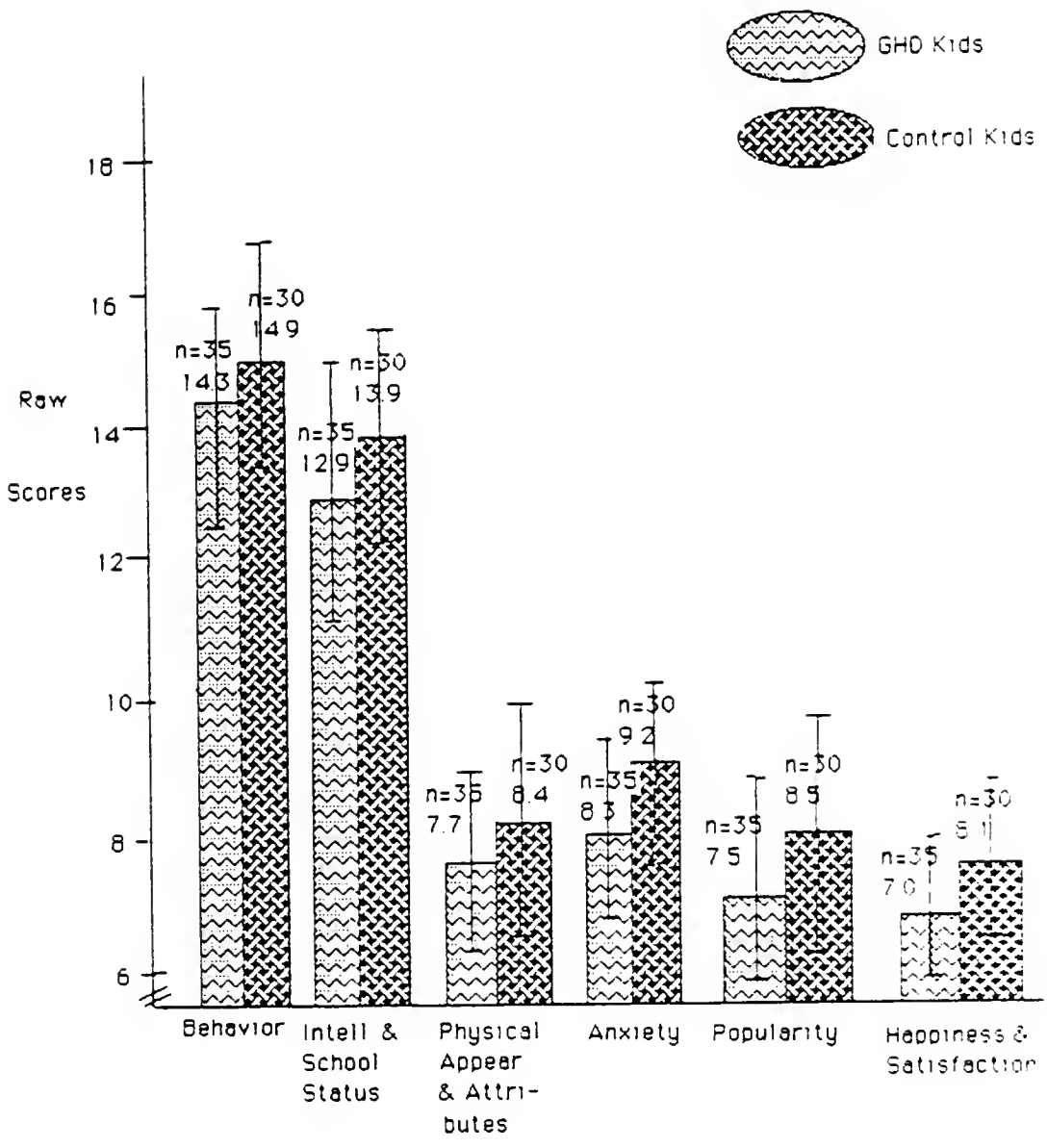

FIGURE 2. Mean ratings on each self-esteem factor. (Actual means are depicted.)

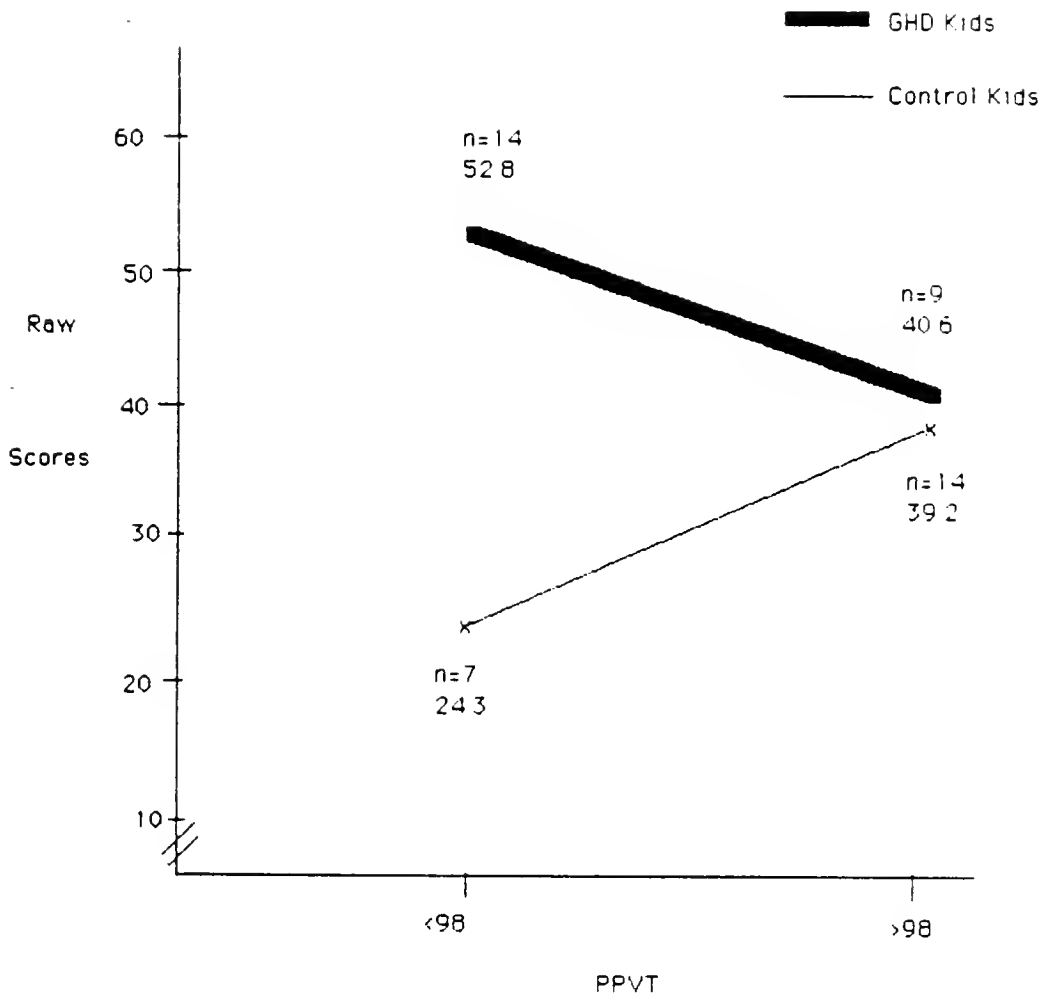

FIGURE 3. Mean ratings on Youth Self-Report Form.
(Group X PPVT interaction.)

mother-rated withdrawal ($F(1,58)=5.07$, $p<.05$), competence in activities ($F(1,58)=9.51$, $p<.01$), in social functioning ($F(1,58)=25.73$, $p<.001$), and at school ($F(1,58)=17.58$, $p<.001$). GHD children were rated by their mothers as more withdrawn and less socially competent in all three areas than were control children. No significant difference between the groups was found on maternal ratings of aggression ($F(1,58)=0.18$, $p>.05$). Figure 4 illustrates these comparisons.

The second analysis looked at mother-ratings of internalization and externalization. The two groups were not significantly different in this analysis ($F(2,61)=2.09$, $p>.05$).

The third analysis comparing mother-ratings of overall behavior problems and social competence was significant overall ($F(2,57)=15.17$, $p<.001$). Separate ANOVAs showed that the groups were rated differently only on overall social competence ($F(1,58)=30.67$, $p<.001$; overall behavior problems: $F(1,58)=2.10$, $p>.05$). The GHD children were rated as significantly less socially competent overall than were the control group children. Figure 5 shows the comparisons between the GHD and control groups on these last two analyses.

Ratings by Fathers

The first analysis comparing the five individual scales was significant overall ($F(5,41)=2.66$, $p<.05$). Separate ANOVAs showed that the groups were rated significantly different by their fathers on two of the three social competence factors--activities ($F(1,45)=8.09$, $p<.01$) and social functioning ($F(1,45)=6.19$, $p<.05$). On each of these factors the GHD children were rated as less competent by their fathers. The groups were not significantly different on paternal ratings of withdrawal ($F(1,45)=0.30$, $p>.05$), paternal ratings of aggression ($F(1,45)=0.63$, $p>.05$) or school competence ($F(1,45)=2.18$, $p>.05$). Figure 6 shows the comparisons between the groups in this analysis.

The second analysis looked at father ratings of internalization and externalization. There was a significant Group X Age interaction ($F(2,47)=3.72$, $p<.05$). Separate F tests indicated that the effect was more likely to be in the ratings of internalization

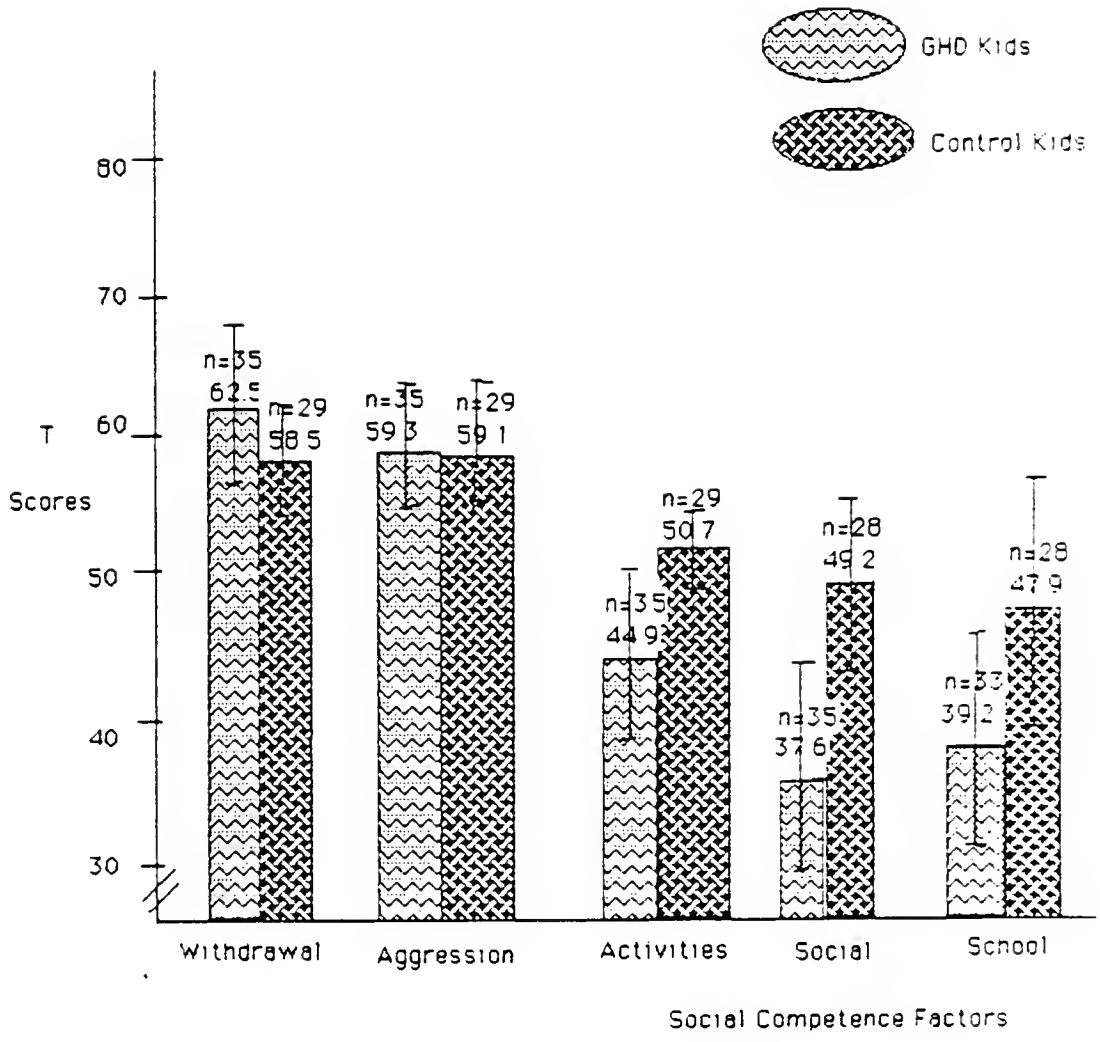

FIGURE 4. Mean ratings by mothers on withdrawal, aggression, and all three social competence factors.

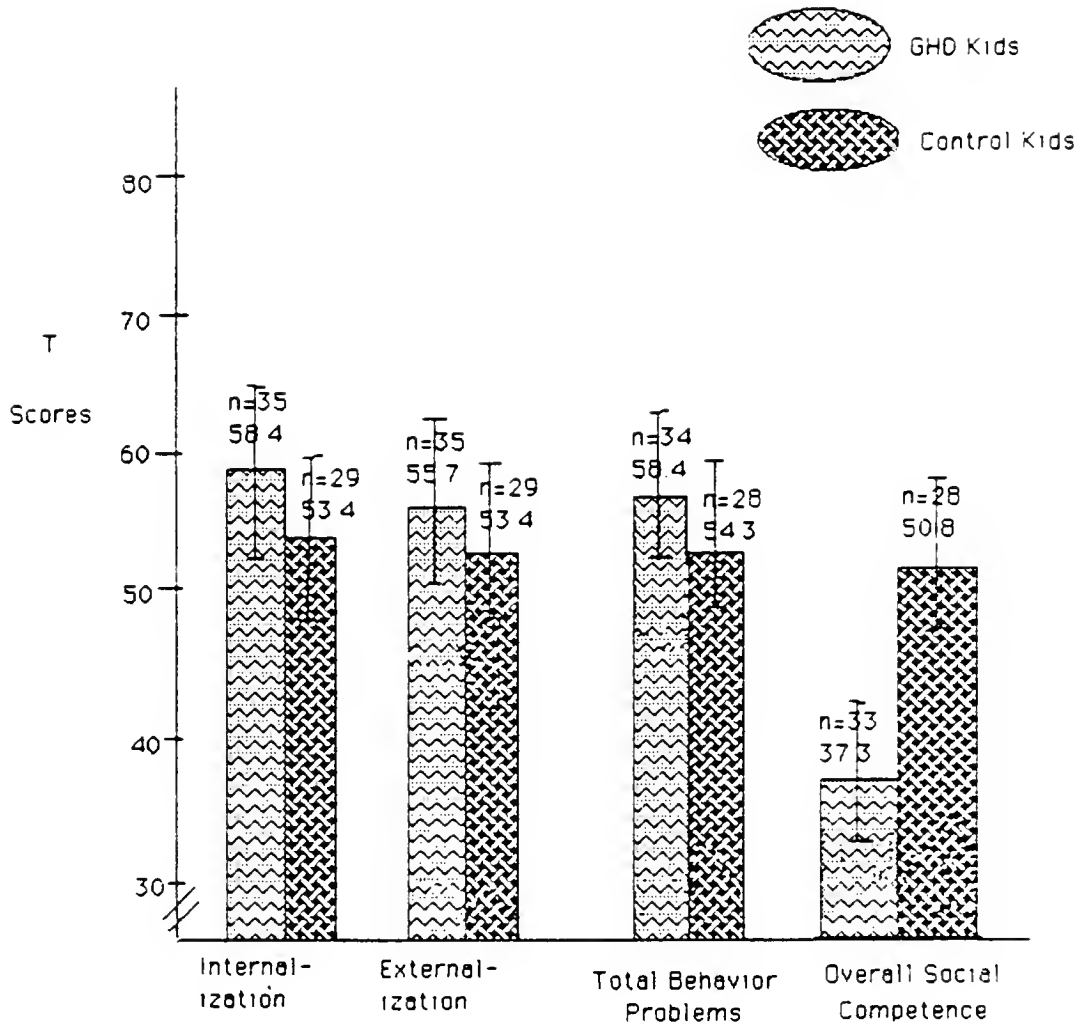

FIGURE 5. Mean maternal ratings of internalization, externalization, total behavior problems and overall social competence.

($F(1,48)=3.46$, $p>.05$; externalization: $F(1,48)=0.00$, $p>.05$). Figure 7 shows this effect. Newman-Keuls tests comparing the means of of each cell indicated that they were not significantly different. The pattern of the interaction must therefore be examined. Figure 7 shows that while the control group children were rated approximately the same in the two age groups (≤12 years and >12years) the older GHD children were rated as more internalizing than were the younger GHD children.

The MANOVA comparing overall behavior problems and overall social competence ratings by fathers indicated that the two groups were significantly different ($F(2,42)=4.93$,$p<.05$). Separate ANOVAs showed that the groups were different on only overall social competence ($F(1,43)=9.50$,$p<.01$). They were not different on total behavior problems ($F(1,43)=0.13$,$p>.05$). Figure 8 illustrates these comparisons.

Teacher Ratings

All teacher ratings are from the Teacher Report Form of the Child Behavior Checklist. The first analysis compared the two groups on the behavior problems scales of withdrawal and aggression. While the overall MANOVA was significant ($F(2,44)=3.32$, $p<.05$), separate ANOVAs on each of the two scales failed to find significant effects (withdrawal: $F(1,45)=2.66$, $p>.05$; aggression: $F(1,45)=2.08$, $p>.05$). Figure 9 depicts these comparisons.

The second analysis compared teacher ratings on the second-order factors of internalization and externalization. While there was a significant Group X Age interaction ($F(2,46)=3.80$,$p<.05$) separate ANOVA's indicated that the two groups were not significantly different on either teacher ratings of internalization or externalization (internalization: ($F(1,47)=0.57$,$p>.05$; externalization: ($F(1,47)=2.40$, $p>.05$). Figures 10 and 11 illustrate the possible interactions for these two variables.

The third analysis compared the teacher ratings of the two groups on total behavior problems. The groups were not rated by their teachers as having significantly different

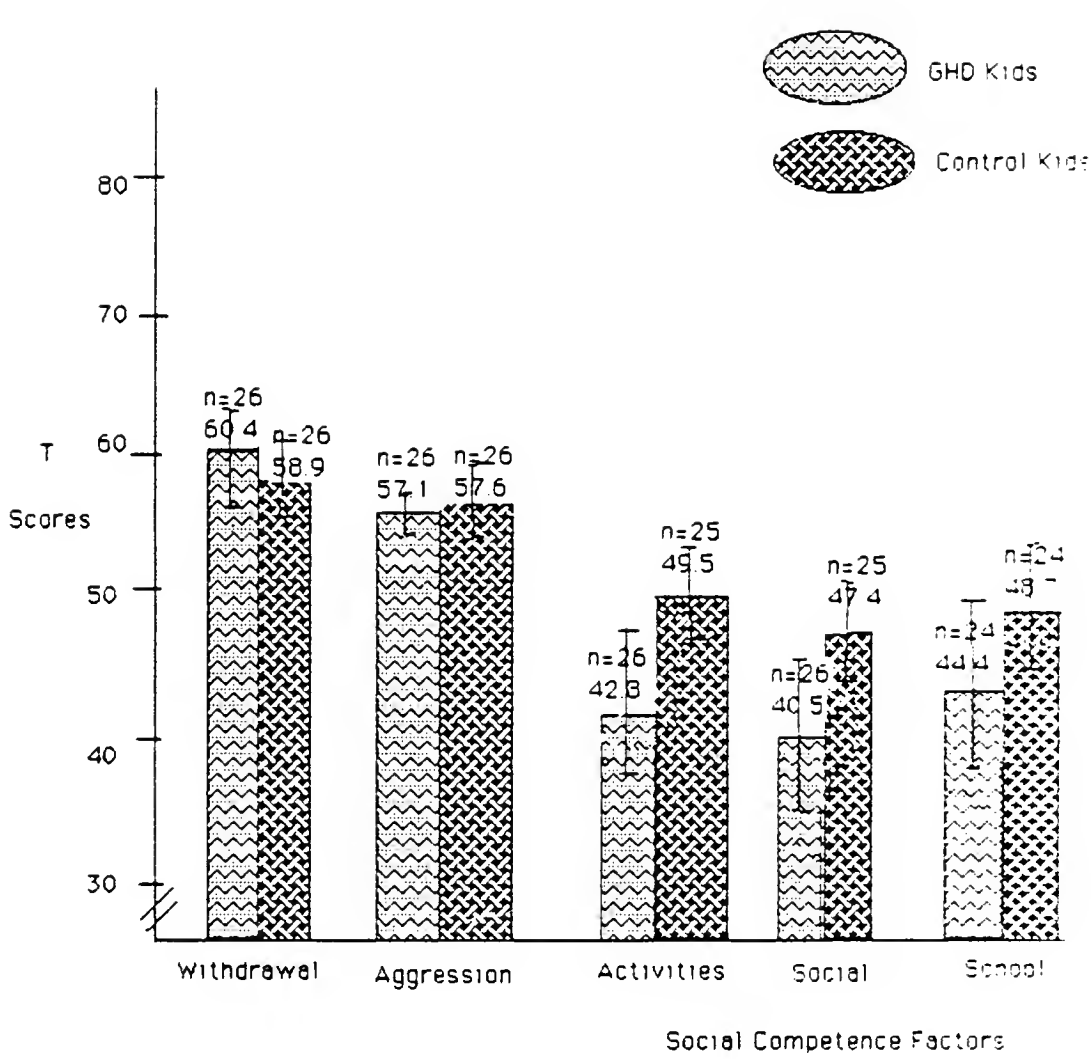

FIGURE 6. Mean ratings by fathers on withdrawal, aggression and all three social competence factors.

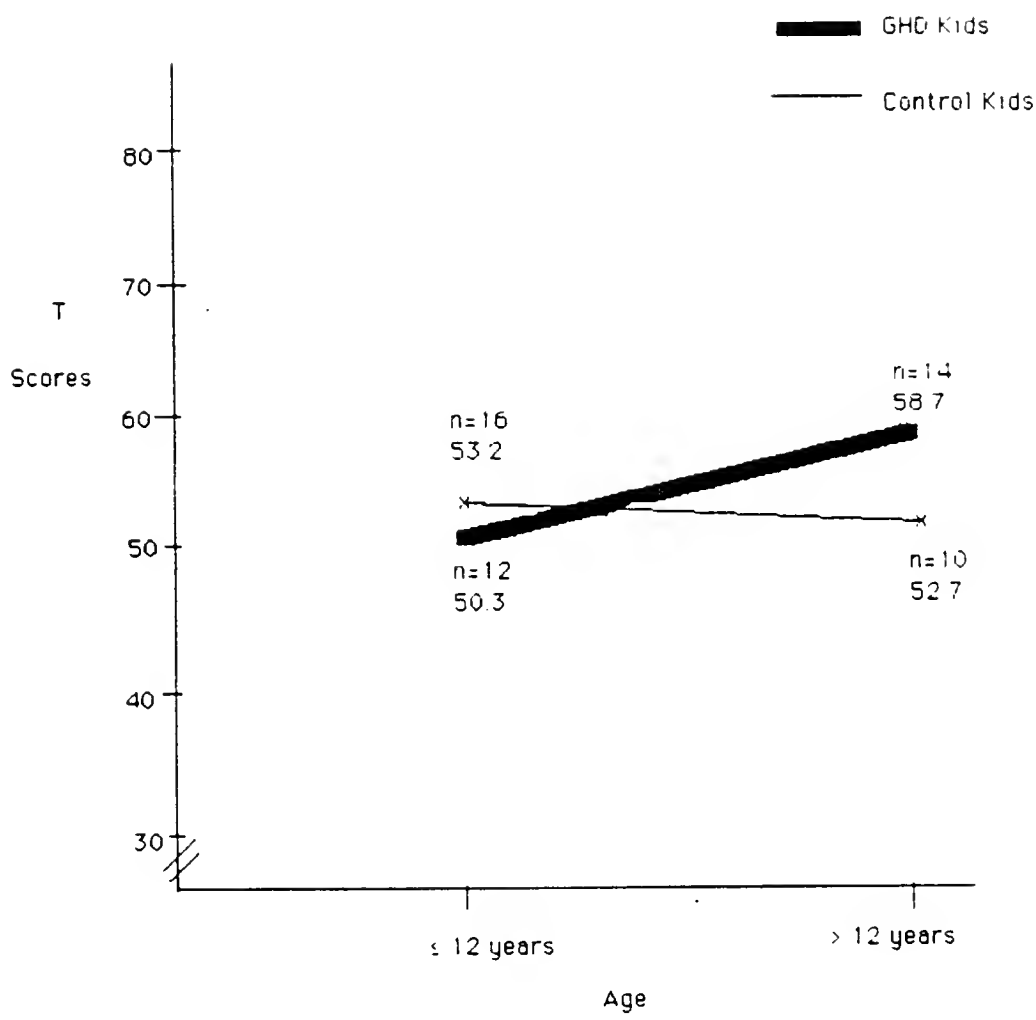

FIGURE 7. Mean ratings by fathers on internalization. (Group X Age interaction.)

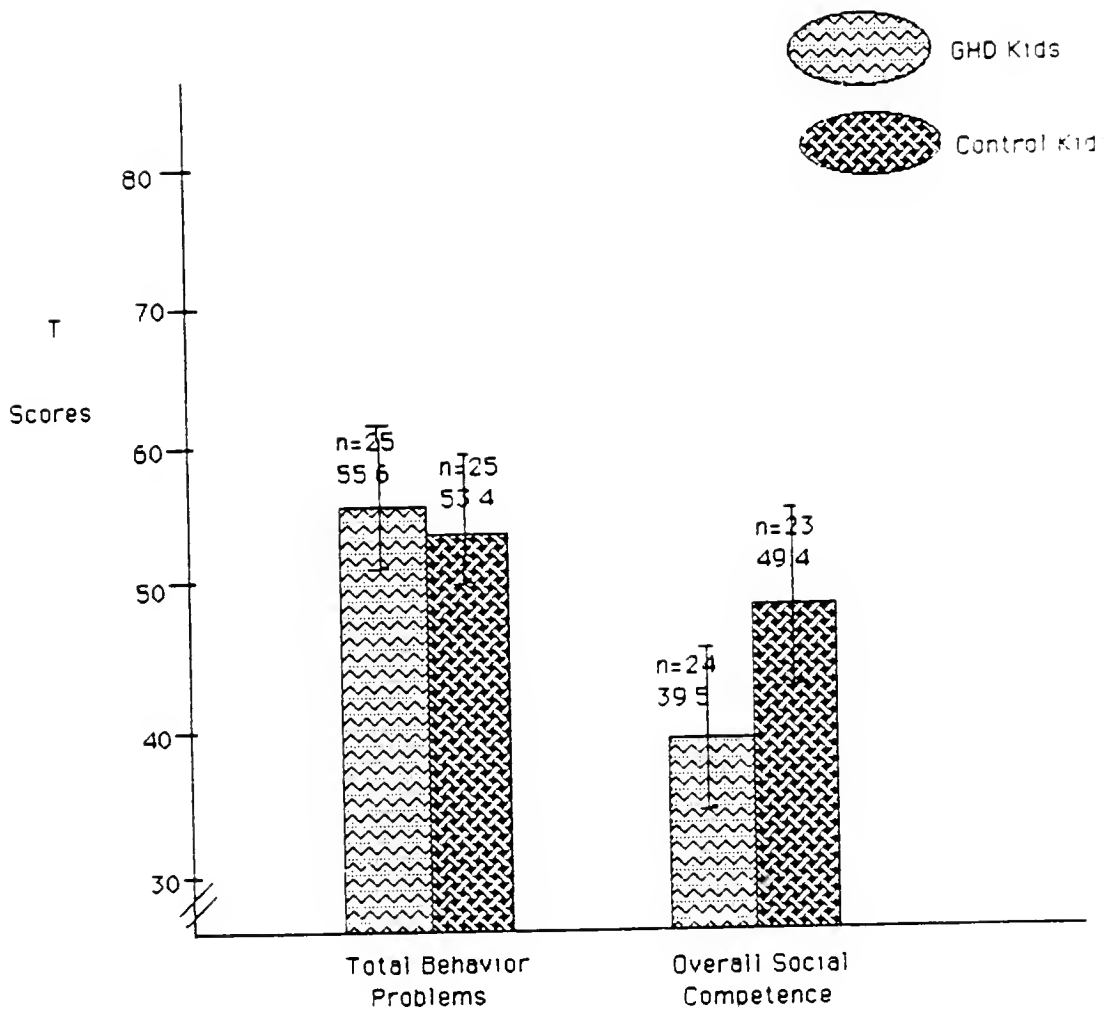

FIGURE 8. Mean ratings by fathers on total behavior problem and overall social competence.

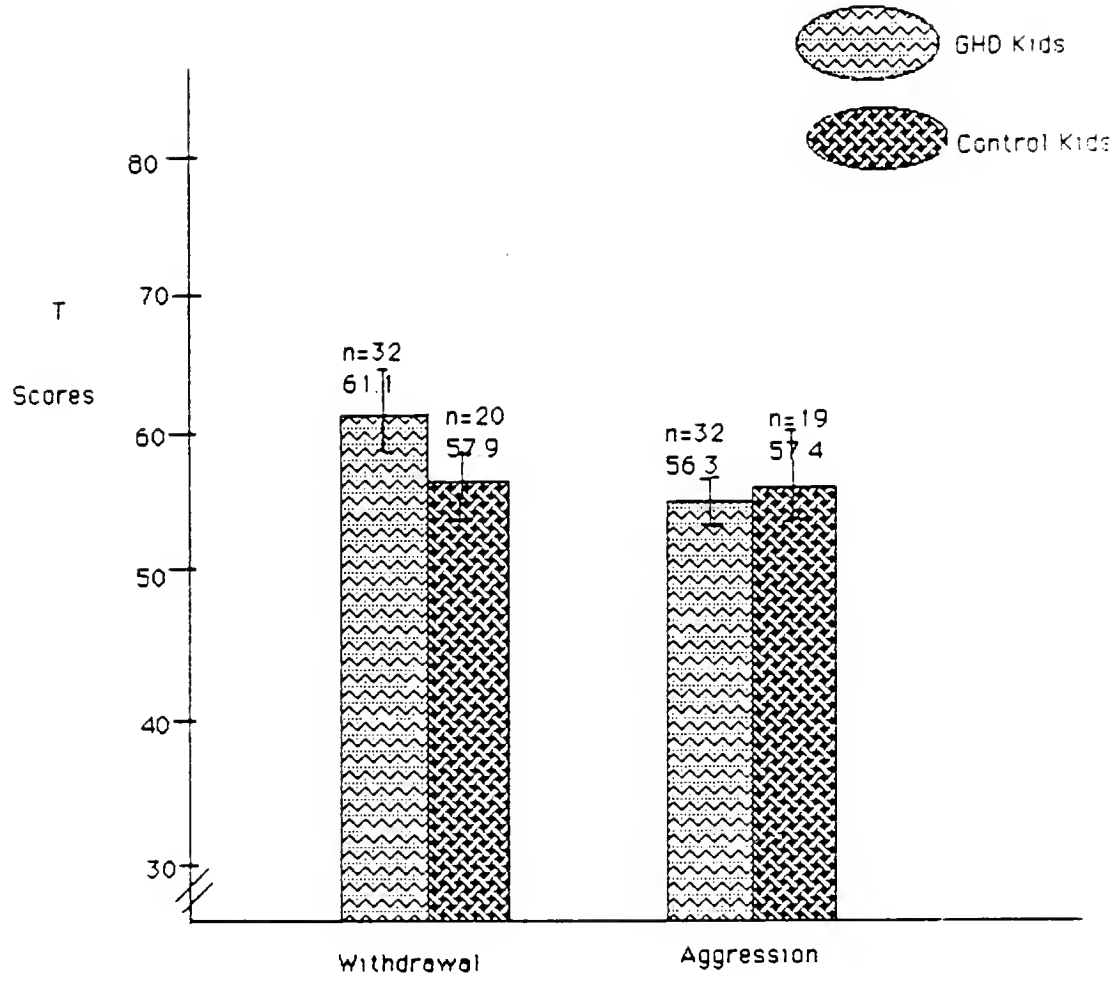

FIGURE 9. Mean ratings by teachers of withdrawal and aggression.

numbers of total behavior problems ($F(1,41)=1.8$, $p>.05$). Figure 12 illustrates this comparison.

The fourth analysis of teacher ratings used a MANOVA to compare teacher ratings of the two groups on five variables--grades, effort, appropriateness of classroom behavior, amount of learning, and happiness. The overall MANOVA contained both significant effects of Group ($F(5,46)=3.03$, $p<.05$) and PPVT ($F(5,46)=3.53$,$p<.01$). Separate ANOVAs on each of the variables indicated that GHD children were rated as having lower grades ($F(1,50)=10.19$, $p<.01$), putting forth less effort ($F(1,50)=7.23$, $p<.05$), learning less ($F(1,50)=4.45$, $p<.05$), and being more unhappy ($F(1,50)=6.05$, $p<.05$) than control children. The groups were not different on ratings of extent of inappropriate behavior in the classroom ($F(1,50)=0.01$, $p>.05$). These comparisons are depicted in Figure 13.

In terms of PPVT, separate ANOVAs indicated that the effect of PPVT was significant only on teacher ratings of grades in school ($F(1,50)=9.08$,$p<.01$). Subjects with lower PPVT scores were rated by their teachers as having significantly lower grades than subjects with higher PPVT scores. This effect is shown in Figure 14.

The final analysis of teacher ratings compared the two groups on total classroom behavior. The groups were significantly different on teacher ratings of total classroom behavior ($F(1,52)=7.53$,$p<.01$). The GHD group were rated as less adaptive on overall classroom behavior. This comparison is depicted in Figure 15.

Peer Ratings

Three analyses were conducted on peer-generated data. The two attractiveness measures were included as covariates in the analysis of the Pupil Evaluation Inventory as one of its factors was significantly correlated with them.

The first analysis was a MANOVA which looked at differences between the groups on the three factors of the Pupil Evaluation Inventory. Both Group status and PPVT score had significant main effects (Group: $F(3,50)=3.3$, $p<.05$; PPVT: $F(3,50)=4.0$, $p<.05$). Separate

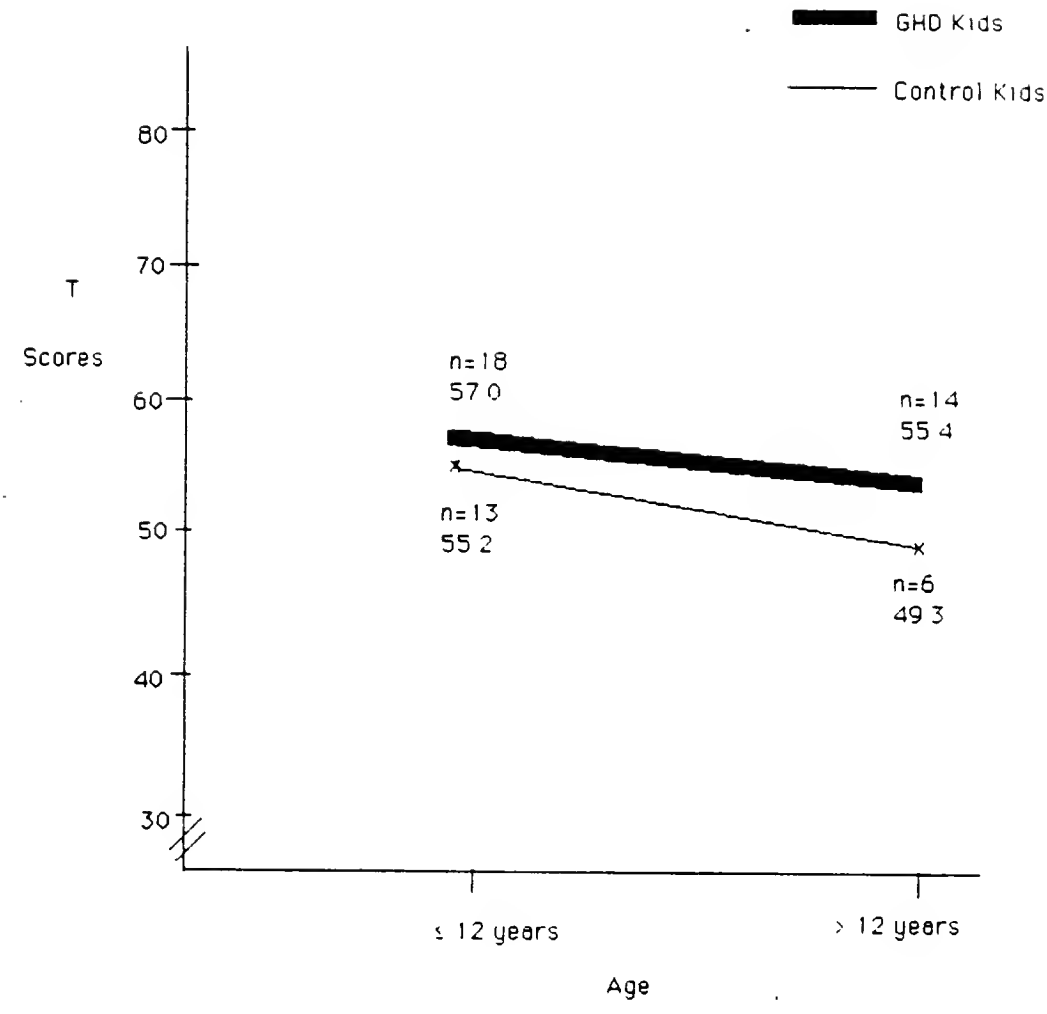

FIGURE 10. Mean teacher ratings on internalization. (Group X Age interaction.)

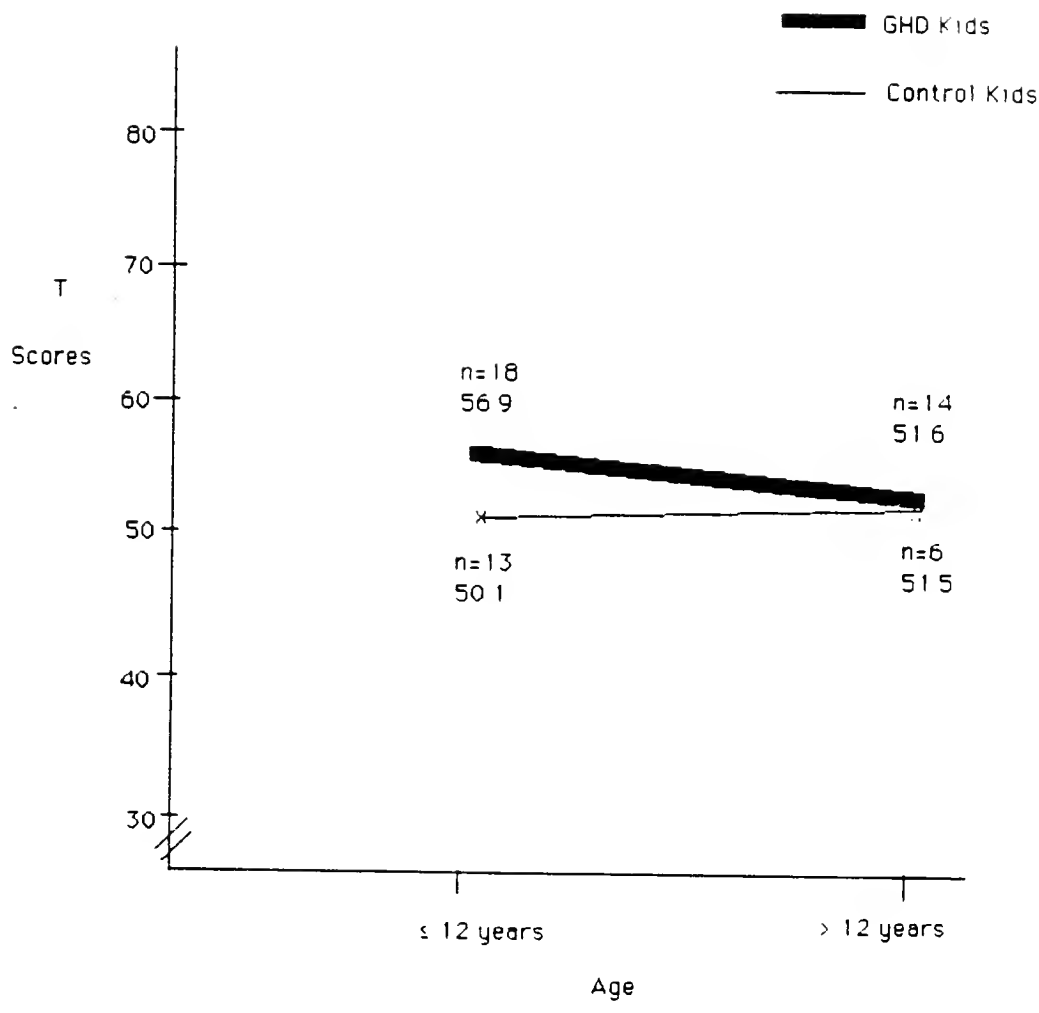

FIGURE 11. Mean teacher ratings on externalization.
(Group X Age interaction.)

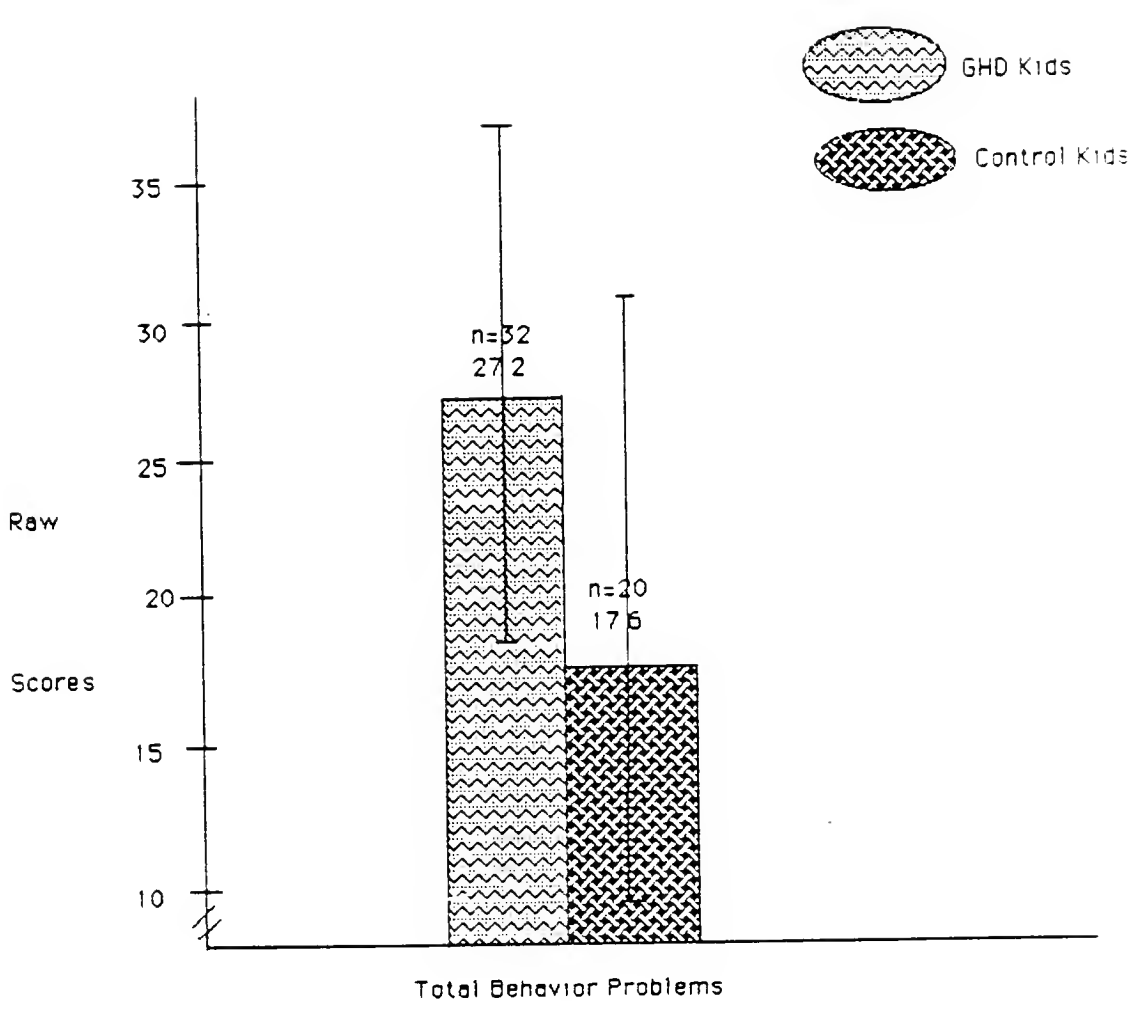

FIGURE 12. Mean teacher ratings of total behavior problems.

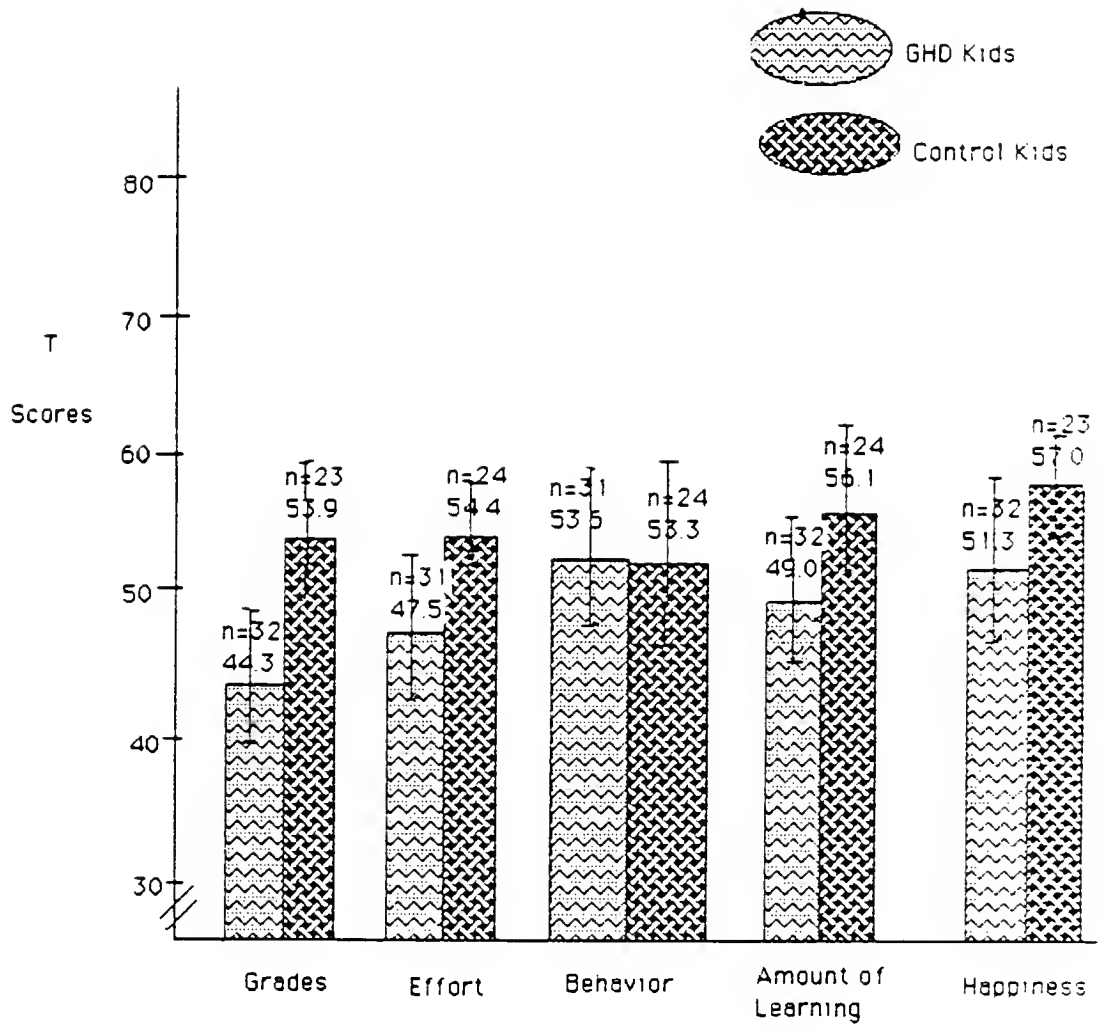

FIGURE 13. Mean ratings by teachers on various factors.

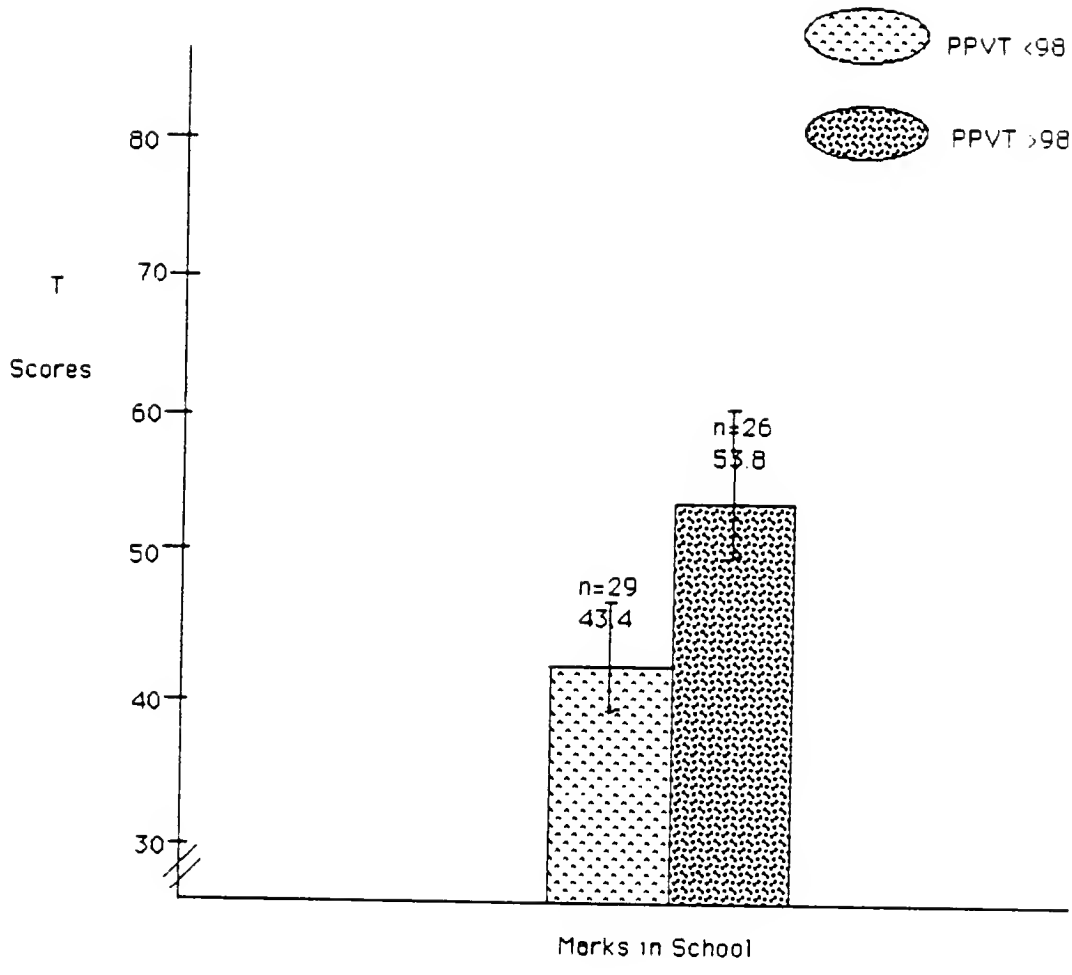

FIGURE 14. Mean teacher ratings of marks made in school.
Note: Higher T-scores=higher marks.

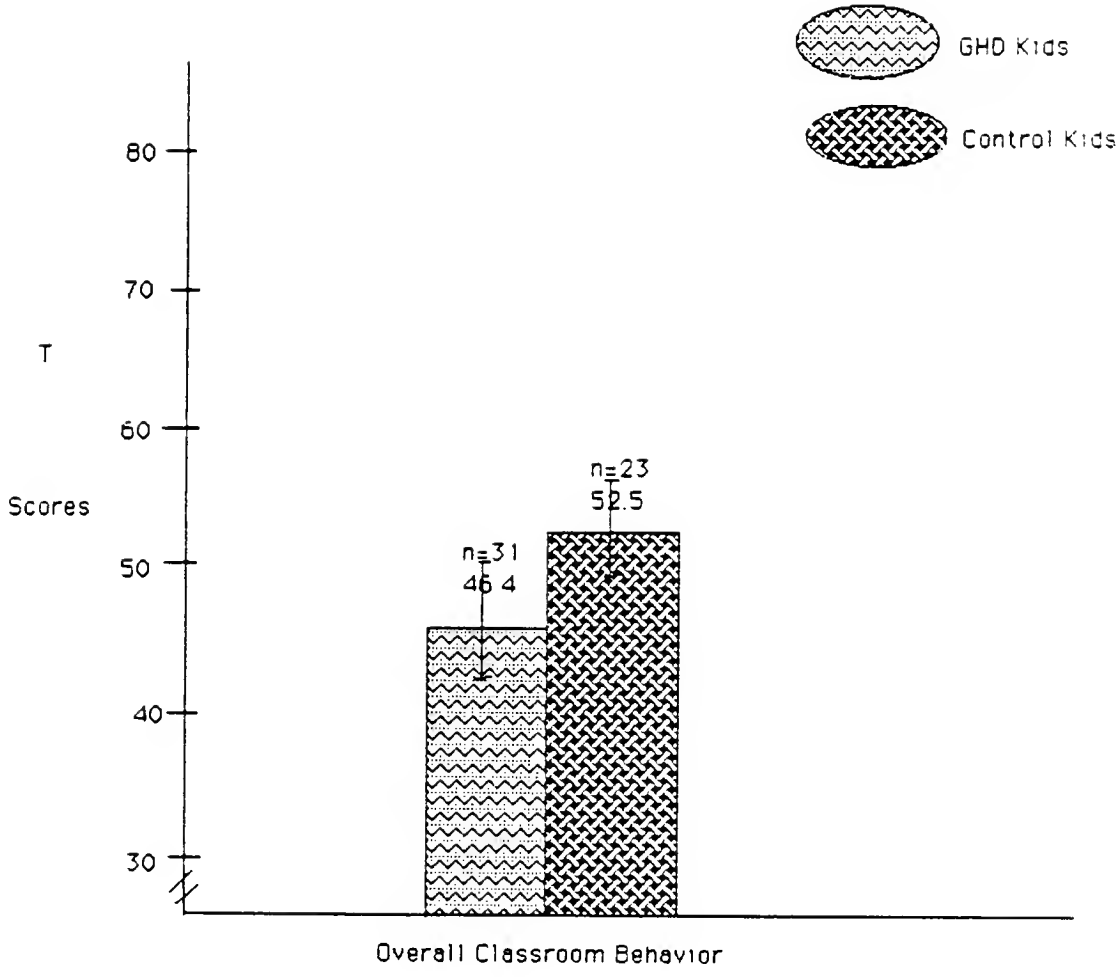

FIGURE 15. Mean teacher ratings of overall classroom behavior.

F tests indicated that both of these effects were significant only for the PEI factor Social Withdrawal (Group: $F(1,52)=7.7$, $p<.01$; PPVT: $F(1,52)=7.0$, $p<.05$). GHD children were rated by their peers as more withdrawn than were control children. Children with lower PPVT scores were also rated as more withdrawn than were children with higher PPVT scores. There were no significant differences between the two groups on either of the other PEI factors (aggression: $F(1,52)=0.4$, $p>.05$; likeability: $F(1,52)=3.8$, $p>.05$). There was a trend, however, for the GHD children to be rated as somewhat less likeable than the control children. The group comparisons are illustrated in Figure 16. The PPVT comparison is shown in Figure 17.

The second analysis compared the two groups on peer nominations of the three classmates liked the most. The two groups were nominated at significantly different rates ($F(1,74)=5.26$, $p<.05$). The GHD children were nominated by significantly fewer of their peers as one of the three classmates liked the most.

The third analysis compared the two groups on peer nominations of the three classmates liked the least. The two groups were not nominated by significantly different rates of their peers as classmates liked the least ($F(1,71)=0.01$, $p>.05$). Figure 18 depicts group differences on the peer nomination data.

Correspondence Between Ratings of Growth Hormone Deficient Children by Different Sources

Table 7 shows the correlations between the ratings of total behavior problems of growth hormone deficient children by each source--mothers, fathers, teachers, and the child himself. The only significant relationship was between the mothers' and fathers' ratings of their children's total behavior problems ($r=0.66$, $p<.01$). The other relationships vary from 0.23 to 0.39.

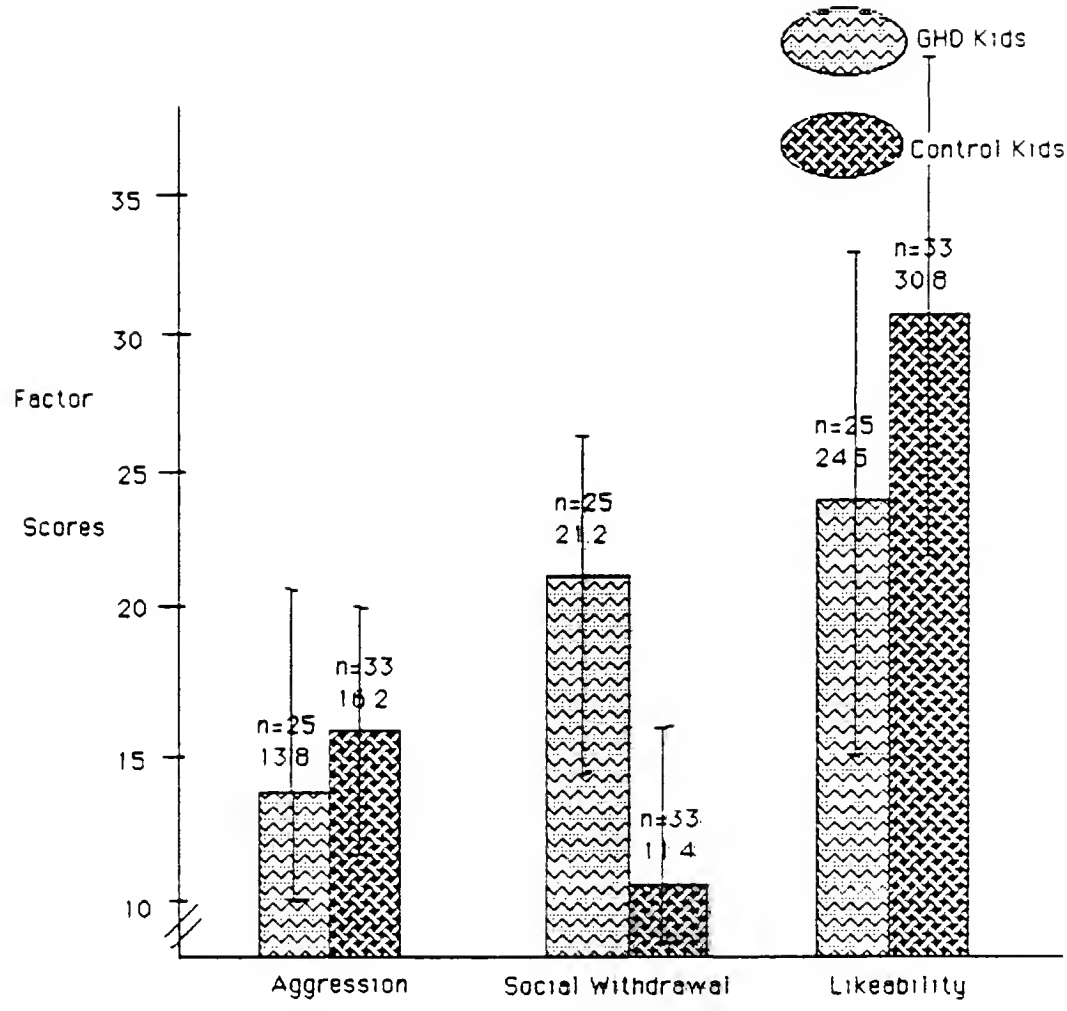

FIGURE 16. Mean ratings by peers on all three PEI factors.

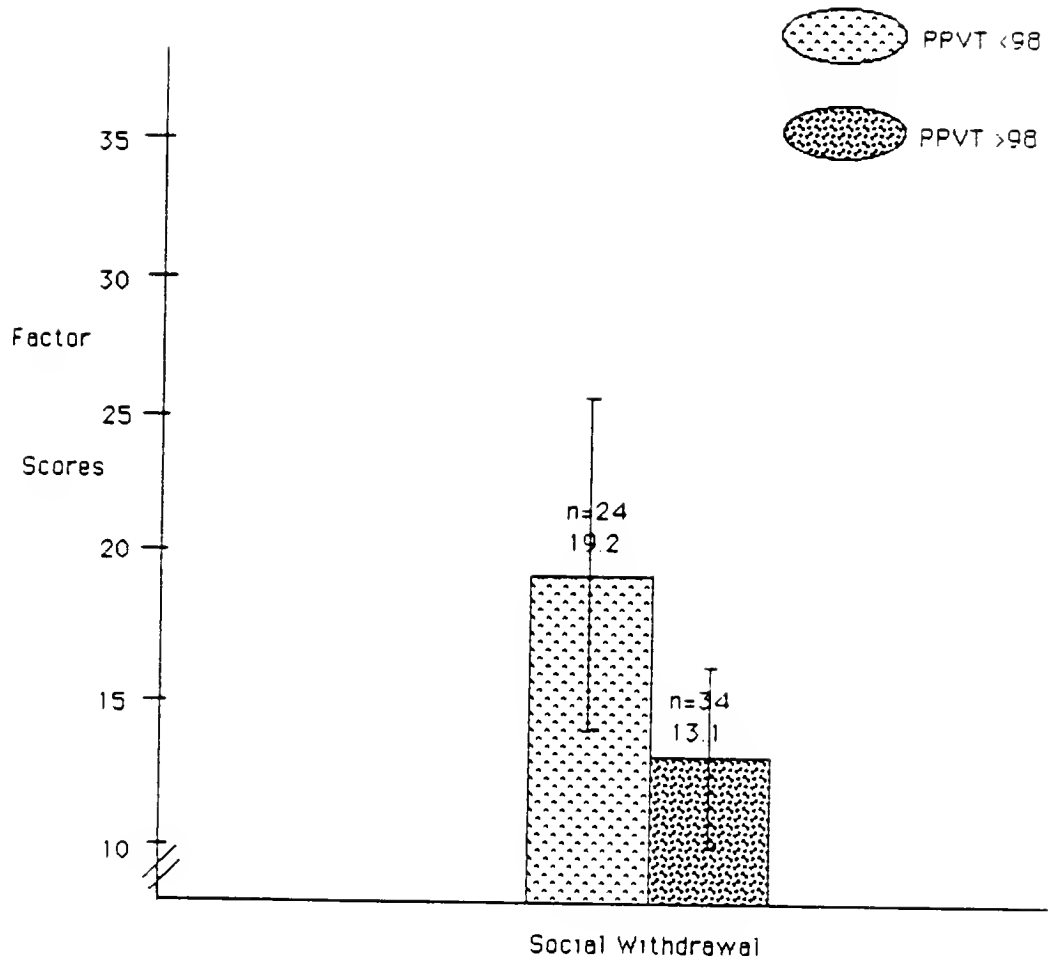

FIGURE 17. Mean social withdrawal ratings by peers according to PPVT scores.

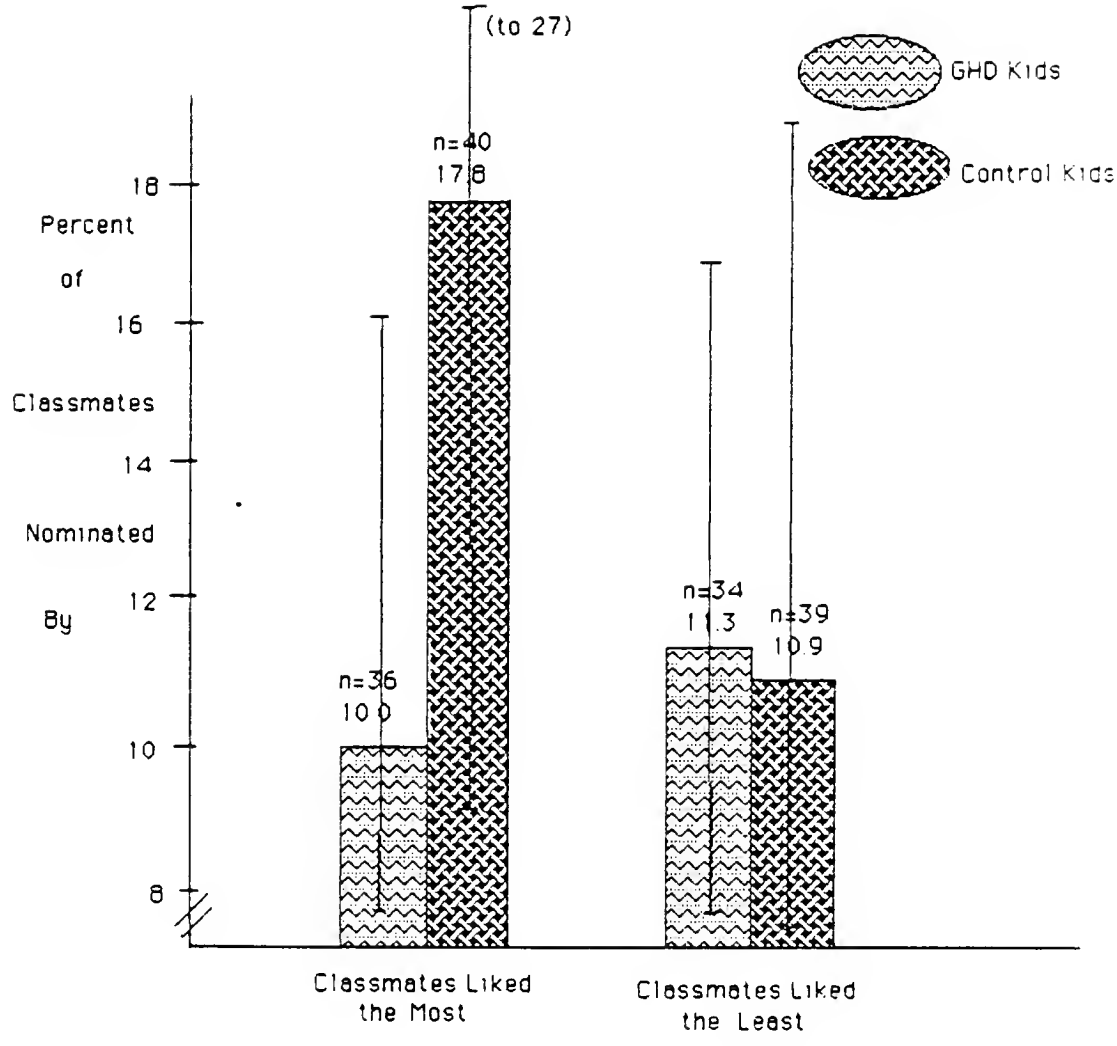

FIGURE 18. Mean percent nominated by peers as one of three classmates liked the most or least.

The mothers and fathers also showed significant agreement in their ratings of each social competence factor and overall competence. On the Activities factor the correlation was 0.70 ($p<.01$, $n=25$ pairs). The Social factor showed a correlation of 0.71 ($p<.01$, $n=25$ pairs). Correlation for the School factor was 0.82 ($p<.01$, $n=21$ pairs). On overall Social Competence ratings between parents correlated 0.75 ($p<.01$, $n=21$ pairs).

Correlations between mother, father, and teacher ratings of the second-order behavior problem factors internalization and externalization are shown in Table 8. All of the mother and father ratings for both of these factors were significanty correlated with each other ($r=0.55$ for internalizing and $r=0.75$ for externalizing). Teacher ratings of internalization and externalization were significantly related to each other ($r=0.71$,$n=32$ pairs,$p<.01$). Teacher ratings were not significantly related to either maternal or paternal ratings of internalization or externalization.

Table 9 shows the correlations between ratings of the growth hormone deficient children on various individual behavior problem scales and overall self-esteem by the different sources.

Mother-Father Correspondence

Ratings of withdrawal by mothers and fathers were significantly correlated ($r=0.71$, $p<.01$), as were ratings of aggression ($r=0.43$, $p<.05$). Correspondence was greater for withdrawal than aggression, however.

Mother-Teacher Correspondence

Ratings by mothers and teachers of withdrawal were not significantly correlated ($r=0.36$, $p>.05$). Mother and teacher ratings of aggression were, however, significantly related ($r=0.49$, $p<.05$).

TABLE 7
Correlations between Ratings
of Total Behavior Problems
by Each Source
(Growth Hormone Deficient Group Only)

	Child (n)	Mother (n)	Father (n)	Teacher (n)
Child	1.00 (23)	0.37 (22)	0.34 (17)	0.23 (16)
Mother		1.00 (34)	0.66 (24)**	0.39 (25)
Father			1.00 (25)	0.27 (19)
Teacher				1.00 (32)

*=p>.05
**=p<.01

TABLE 8
Correlations between Ratings by Each Source
of Internalization and
Externalization
(Growth Hormone Deficient Group)

	Mother		Father		Teacher	
	Internali-(n)zation	Externali-(n)zation	Internali-(n)zation	Externali-(n)zation	Internali-(n)zation	Externali-(n)zation
Mother:						
Int.	1.00(35)	0.75(35)**	0.55(25)**	0.61(25)**	0.18(25)	0.16(25)
Ext.		1.00(35)	0.46(25)*	0.75(25)**	0.36(25)	0.31(25)
Father:						
Int.			1.00(26)	0.78(26)**	0.27(18)	0.08(18)
Ext.				1.00(26)	0.28(18)	0.21(18)
Teacher:						
Int.					1.00(32)	0.71(32)**
Ext.						1.00(32)

*=p<.05
**=p<.01

TABLE 9
Correlations between Ratings by Each Source
of Separate Behavior Problems
(Growth Hormone Deficient Group Only)

	Mother		Father		Teacher	
	With-drawal(n)	Aggr-ession(n)	With-drawal(n)	Aggr-ession(n)	With-drawal(n)	Aggr-ession(n)
Mother:						
With-drawal	1.00(35)	0.54(35)**	0.71(25)**	0.17(25)	0.36(26)	0.29(25)
Aggr-ession		1.00(35)	0.34(25)	0.43(25)*	0.22(26)	0.49(25)*
Father:						
With-drawal			1.00(26)	0.51(26)**	0.21(19)	0.25(18)
Aggr-ession				1.00(26)	-0.24(19)	-0.22(18)
Teacher:						
With-drawal					1.00(32)	0.53(30)**
Aggr-ession						1.00(32)

*=p<.05
**=p<.01

Table 9--continued.

	Child	Peers				
	Self-Esteem(n)	Aggr-ession(n)	With-drawal(n)	Like-ability(n)	Liked Most(n)	Liked Least(n)
Mother:						
With-drawal	-0.30(35)	-0.27(19)	-0.13(19)	0.08(19)	0.04(26)	-0.09(24)
Aggr-ession	-0.15(35)	0.29(19)	0.04(19)	0.20(19)	0.14(26)	0.07(24)
Father:						
With-drawal	-0.20(26)	-0.33(15)	0.31(15)	-0.03(15)	-0.35(21)	0.06(19)
Aggr-ession	-0.21(26)	0.10(15)	0.37(15)	-0.13(15)	-0.39(21)	0.01(19)
Teacher:						
With-drawal	-0.02(26)	0.26(20)	0.16(20)	-0.34(20)	-0.23(28)	0.43(26)*
Aggr-ession	0.07(25)	0.67(21)**	-0.01(21)	-0.05(21)	0.12(28)	0.36(26)
Child:						
Self-Esteem	1.00(36)	-0.15(20)	-0.26(20)	0.31(20)	0.06(27)	-0.40(25)*
Peers:						
Aggr-ession		1.00(25)	0.21(25)	-0.03(25)	0.26(25)	0.52(25)*
Withdrawal			1.00(25)	-0.13(25)	-0.25(25)	0.59(25)**
Likeability				1.00(25)	0.79(25)**	-0.36(25)
Liked Most					1.00(36)	-0.07(34)
Liked Least						1.00(34)

*=p<.05
**=p<.01

Mother-Child Correspondence

Neither maternal ratings of withdrawal nor maternal ratings of aggression were related to child ratings of self-esteem (withdrawal: r=-0.30, p>.05; aggression: r=-0.15, p>.05).

Mother-Peer Correspondence

Neither mother and peer ratings of withdrawal nor mother and peer ratings of aggression were significantly related (withdrawal: r=-0.13, p>.05; aggression: r=0.29, p>.05).

Father-Teacher Correspondence

Neither father and teacher ratings of withdrawal nor father and teacher ratings of aggression were significantly related (withdrawal: r=0.21, p>.05; aggression: r=-0.22, p>.05).

Father-Child Correspondence

Neither father ratings of withdrawal nor father ratings of aggression were significantly related to child self-esteem ratings (withdrawal: r=-0.20, p>.05; aggression: r=-0.21, p>.05).

Father-Peer Correspondence

Neither father and peer ratings of withdrawal nor father and peer ratings of aggression were significantly related (withdrawal: r=0.31, p>.05; aggression: r=0.10, p>.05).

Teacher-Child Correspondence

Neither teacher ratings of withdrawal nor teacher ratings of aggression were significantly related to child self-esteem ratings (withdrawal: r=-0.02, p>.05; aggression: r=0.07, p>.05).

Teacher-Peer Correspondence

Teacher and peer ratings of withdrawal were not significantly related (r=0.17, p>.05). Teacher and peer ratings of aggression were significantly related, however (r=0.66, p<.01).

Child-Peer Correspondence

Neither peer ratings of withdrawal nor peer ratings of aggression were significantly related to child self-esteem ratings (withdrawal: r=-0.26, p>.05; aggression: r=-0.15, p>.05). There was a significant inverse relationship between child self-esteem ratings and peer ratings of those classmates liked least (r=-0.40, p<.05). High self-esteem ratings were associated with a low number of nominations as a classmate liked the least.

Table 10 shows the correlations between the six scales of the Piers-Harris Self-Concept scale (behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction) and the ratings of withdrawal and aggression by all sources and all sociometric ratings. Higher scores on each self-concept factor indicate more adaptive attitudes or behavior. Of the 66 correlations listed only six of them reached significance. Four of these were relationships with peer nominations of classmates liked the least. Lower self-ratings of behavior (r=-0.38,n=25 pairs,p<.05), intellectual and school status (r=-0.46,n=25 pairs,p<.05), popularity (r=-0.48,n=25 pairs,p<.05), and happiness and satisfaction (r=-0.53,n=25 pairs,p<.01) were associated with higher rates of nomination as a peer liked the least. Peer ratings of social withdrawal were related to self-ratings of anxiety (r=-0.50,n=20 pairs,p<.05) such that higher ratings of social withdrawal were related to higher levels of anxiety. Peer ratings of likeability were significantly related to self-ratings of intellectual and school status (f=0.58,n=20 pairs,p<.01) such that higher ratings of likeability were related to higher self-ratings of intellectual status.

A final approach to looking at the correspondence between ratings by the different sources is illustrated in Table 11. Correlations were derived between each of the peer rating measures and each of the parental social competence scales and total competence measure. The notion between this approach involves conceptualizing the peer rating data as peer-generated

TABLE 10
Correlations between Ratings by Each Source
of Separate Behavior Problems and Child Ratings
of Each Self-Esteem Factor
(Growth Hormone Deficient Group Only)

	Child Self-Esteem Factors					
	Behav-ior(n)	Intell. & School Status(n)	Phys. Appear.(n)	Anxiety(n)	Popul-arity(n)	Happin. & Satis.(n)
Mother:						
With-drawal	-0.09(33)	-0.11(33)	-0.32(33)	-0.23(33)	-0.13(33)	-0.19(33)
Aggr-ession	-0.09(33)	-0.09(33)	0.03(33)	-0.07(33)	0.11(33)	-0.02(33)
Father:						
With-drawal	0.26(24)	0.01(24)	-0.23(24)	-0.30(24)	-0.01(24)	-0.04(24)
Aggr-ession	0.00(24)	-0.03(24)	-0.15(24)	-0.20(24)	0.03(24)	-0.08(24)
Teacher:						
With-drawal	0.02(25)	-0.12(25)	-0.08(25)	0.39(25)	-0.26(25)	-0.19(25)
Aggr-ession	-0.06(24)	-0.01(24)	0.35(24)	0.35(24)	0.13(24)	0.12(24)

*=p<.05
**=p<.01

Table 10--continued.

	Child Self-Esteem Factors											
	Behav-ior(n)		Intell. & School Status(n)		Phys. Appear.(n)		Anxiety(n)		Popul-arity(n)		Happin. & Satis.(n)	
Peers:												
With-drawal	-0.11	(20)	-0.22	(20)	-0.18	(20)	-0.50	(20)**	-0.24	(20)	-0.19	(20)
Aggr-ession	-0.41	(20)	-0.18	(20)	0.24	(20)	0.07	(20)	-0.21	(20)	-0.32	(20)
Like-ability	0.36	(20)	0.58	(20)**	0.35	(20)	-0.04	(20)	0.37	(20)	0.25	(20)
Like Most	0.01	(26)	0.22	(26)	0.24	(26)	0.13	(26)	0.14	(26)	-0.03	(26)
Like Least	-0.38	(25)*	-0.46	(25)*	-0.30	(25)	-0.27	(25)	-0.48	(25)*	-0.53	(25)*

*=p<.05
**=p<.01

social competence ratings. Table 11 shows that peer ratings of aggression, likeability, and nominations of classmates liked the most were not significantly related to any of the parental social competence ratings. Maternal ratings of school competence and total social competence were significantly related to peer-rated social withdrawal (r=-0.50 and -0.54, respectively). Father ratings of social competence and total competence were also significantly related to peer-rated social withdrawal (r=-0.53 and -0.63, respectively). Each of these correlations indicates an association between high levels of parent-rated social competence and low levels of peer-rated social withdrawal. Additionally, father-rated social competence and both mother and father-rated total social competence were significantly related to peer nominations of classmates liked the least (r=-0.50, -0.43, and -0.49, respectively). Each of these correlations indicates an association between high levels of parent-rated social competence and low numbers of nominations as a classmate liked the least.

Correpondence Between Ratings of Control Children and Total Sample by Different Sources

Correlations were also obtained between ratings by the different sources for the control group and for the sample as a whole. In this section only patterns of relationship different from those found with the growth hormone deficient children alone will be discussed.

In terms of total behavior problems, correlations of the total sample contained three more significant relationships. Child self-ratings of total behavior problems were significantly related to both mother and father ratings of total behavior problems (r=0.37,n=41 pairs,p<.05, and r=0.34,n=34 pairs,p<.05, respectively). Mother ratings of total behavior problems also become significantly related to teacher ratings of total behavior problems in the total sample (r=0.40,n=37 pairs,p<.05).

The internalization and externalization ratings are the same for the most part.

TABLE 11
Correlations between Parental Social Competence Ratings and Peer Ratings
(Growth Hormone Deficient Group Only)

	Peers									
	Aggression	(n)	Withdrawal	(n)	Likeability	(n)	Liked Most	(n)	Liked Least	(n)
Mother:										
Activities:	-0.34	(19)	-0.01	(19)	-0.17	(19)	-0.26	(26)	-0.38	(24)
Social:	-0.09	(19)	-0.38	(19)	0.07	(19)	0.24	(26)	-0.34	(24)
School:	-0.18	(17)	-0.50	(17)*	0.13	(17)	0.27	(24)	-0.07	(22)
Total:	-0.29	(17)	-0.54	(17)*	0.01	(17)	0.20	(24)	-0.43	(22)*
Father:										
Activities:	-0.29	(15)	-0.26	(15)	-0.28	(15)	-0.17	(21)	-0.43	(19)
Social:	0.04	(15)	-0.53	(15)*	0.06	(15)	0.28	(21)	-0.50	(19)*
School:	-0.12	(14)	-0.47	(14)	0.50	(14)	0.28	(20)	-0.26	(18)
Total:	-0.30	(14)	-0.63	(14)*	0.06	(14)	0.26	(20)	-0.49	(18)*

*=p<.05

Several differences do emerge in the correlations between each ratings by each source on the separate behavior problems:

Mother-Teacher Correspondence

Mothers and teachers agree on aggressiveness in the GHD children but not the control children (GHD: r=0.49,n=25 pairs,p<.05; control: r=-0.15, n=11 pairs, p>,05).

Mother-Child Correspondence

In the total sample there is a significant correlation between mother-rated withdrawal and child-rated self-esteem (r=-0.26,n=64 pairs, p<.05).

Mother-Peer Correspondence

In both the control group alone and in the total sample there are significant relationships between ratings of aggression by mothers and peers (controls: r=0.55,n=22 pairs, p<.01; total sample: r=0.44,n=41 pairs, p<.01).

Father-Teacher Correspondence

There is a significant correlation between father and teacher rated withdrawal in the control group (r=0.82,n=10 pairs, p<.01).

Father-Child Correspondence

In both the control group and total sample there are significant relationships between father-rated aggression and child-rated self-esteem (controls: r=-0.51,n=26 pairs, p<.05; total sample: r=-0.34,n=52 pairs, p<.05).

Father-Peer Correspondence

Father and peer rated withdrawal are significantly related in both the control group and total sample (controls: r=0.51,n=21 pairs, p<.05; total sample: r=0.46,n=36 pairs, p<.01).

Teacher-Child Correspondence

In the control group teacher-rated withdrawal is significantly related to child-rated self-esteem (r=0.55,n=13 pairs, p<.05).

Child-Peer Correspondence

Both the control group and total sample show significant relationships between child-rated self-esteem and peer-rated withdrawal (controls: r=-0.41,n=24 pairs, p<.05; total sample: r=-0.37,n=44 pairs, p<.05), likeability (controls: r=0.59,n=24 pairs, p<.01; total sample: r=0.47,n=44 pairs, p<.01), and nominations of classmates liked the most (controls: r=0.41,n=31 pairs, p<.05; total sample: r=0.30,n=58 pairs, p<.05).

There were also some changes in the patterns of relationship between ratings by each source and child ratings on the six Piers-Harris Self-Concept scale factors:

1. Mother-rated aggression was significantly related to self-rated inappropriate behavior in both the control group (r=-0.60,n=28 pairs, p<.01) and the total sample (r=0.30,n=61 pairs, p<.05).

2. Father rated withdrawal was significantly related to self-rated poor physical appearance in the total sample (r=-0.29,n=49 pairs, p<.05). Father-rated withdrawal was also significantly related to self-rated lack of popularity in the control group (r=-0.40,n=25 pairs, p<.05).

3. Father-rated aggression was significantly related to both self-rated inappropriate behavior and lack of popularity in the control group (behav: r=-0.63,n=25 pairs, p<.01; pop: r=-0.50,n=25 pairs, p<.05) and total sample (behav: r=-0.35,n=49 pairs, p,>05; pop: r=-0.28,n=49 pairs, p<.05).

4. Peer-rated withdrawal was not significantly related to self-rated anxiety in either the control group or total sample. It was significantly related to self-rated inappropriate behavior in both the control group (r=-0.56,n=23 pairs, p<.01) and total sample (r=-0.49,n=43 pairs, p<.01).

5. Peer-rated aggression was significantly related to self-rated anxiety in the total sample ($r=-0.48, n=43$ pairs, $p<.01$) and lack of popularity in both the control group ($r=-0.52, n=23$ pairs, $p<.05$) and the total sample ($r=-0.36, n=43$ pairs, $p<.05$).

6. Peer-rated likeability was significantly related to self-rated appropriate behavior in both the control group ($r=0.46, n=23$ pairs, $p<.05$) and the total sample ($r=0.42, n=43$ pairs, $p<.01$), physical appearance in the total sample ($r=0.38, n=43$ pairs, $p<.05$), and popularity in both the control group ($r=0.53, n=23$ pairs, $p<.01$) and total sample ($r=0.47, n=43$ pairs, $p<.01$).

7. Peer nomination as a classmate liked the most was significantly related to three scales in both the control group and total sample: intellectual and school status (controls: $r=0.52, n=30$ pairs, $p<.01$; total sample: $r=0.41, n=56$ pairs, $p<.01$), physical appearance (controls: $r=0.37, n=30$ pairs, $p<.05$; total sample: $r=0.34, n=56$ pairs, $p<.05$), and popularity (controls: $r=0.50, n=30$ pairs, $p<.01$; total sample: $r=0.39, n=56$ pairs, $p<.01$).

8. While self-rated unhappiness and dissatisfaction was significantly related to peer nomination as a classmate liked the least in the GHD group, this was not true for either the control group alone or the total sample.

Relationships Between Measures of Adjustment and Current Perceptions of Height in the Growth Hormone Deficient Children

Thirty-five GHD children completed Silhouette Apperception Test-Revised (SAT-R) ratings of their current height, expectation for adult height, and expectation for height in one year relative to same age and sex peers. Ratings on each of these dimensions were also obtained for each GHD child by the physician's assistant (PA) who works closely with them. The PA's ratings were subtracted from the child's ratings to obtain a difference score on each dimension. This section discusses analyses designed to see whether ratings of adjustment vary between GHD children who are realistic about their present height and those who overestimate.

Four children rated themselves as shorter than they actually are according to PA ratings. These children are not included in these analyses. Of the 31 remaining children 11 rated their height at the same percentile as did the PA. The other 20 children overestimated their height.

The two perception groups were not significantly different on PPVT scores ($t(27)=1.74$, $p>.05$). However, the group who overestimated their height tended to receive higher PPVT scores (realistic: $X=87.5$, s.d.=14.1; overestimators: $X=99.6$, s.d.=20.0).

Analyses used either ANOVA or MANOVA with the major factor being Perception at two levels - realistic (no different from PA) versus overestimated (rated self as taller than did PA). The effects of age and sex were also investigated in each analysis and kept in the model only where significant.

Child Self-Ratings

Social desirability was used as a covariate in these analyses. The first analysis compared the two height perception groups on ratings of self-esteem. The two groups were significantly different on this analysis ($F(1,28)=4.9$, $p<.05$). The children who had realistic perceptions of their height had lower self-esteem as group than the children with overestimated perceptions of their height. The mean self-esteem of the group who overestimated their height was well above the mean self-esteem of the general population according to norms (Piers, 1969). Figure 19 illustrates this comparison.

The second analysis compared the two perception groups on separate scales of the Piers-Harris Self-Concept scale. The overall MANOVA was significant ($F(6,21)=2.70$,$p<.05$) taking social desirabilty into account. Separate ANOVAs indicated that the groups rated themselves significantly differently on intellectual and school status ($F(1,26)=11.27$,$p<.01$) and popularity ($F(1,26)=11.08$,$p<.01$). The children who overestimated their height also rated themselves as having significantly higher intellectual

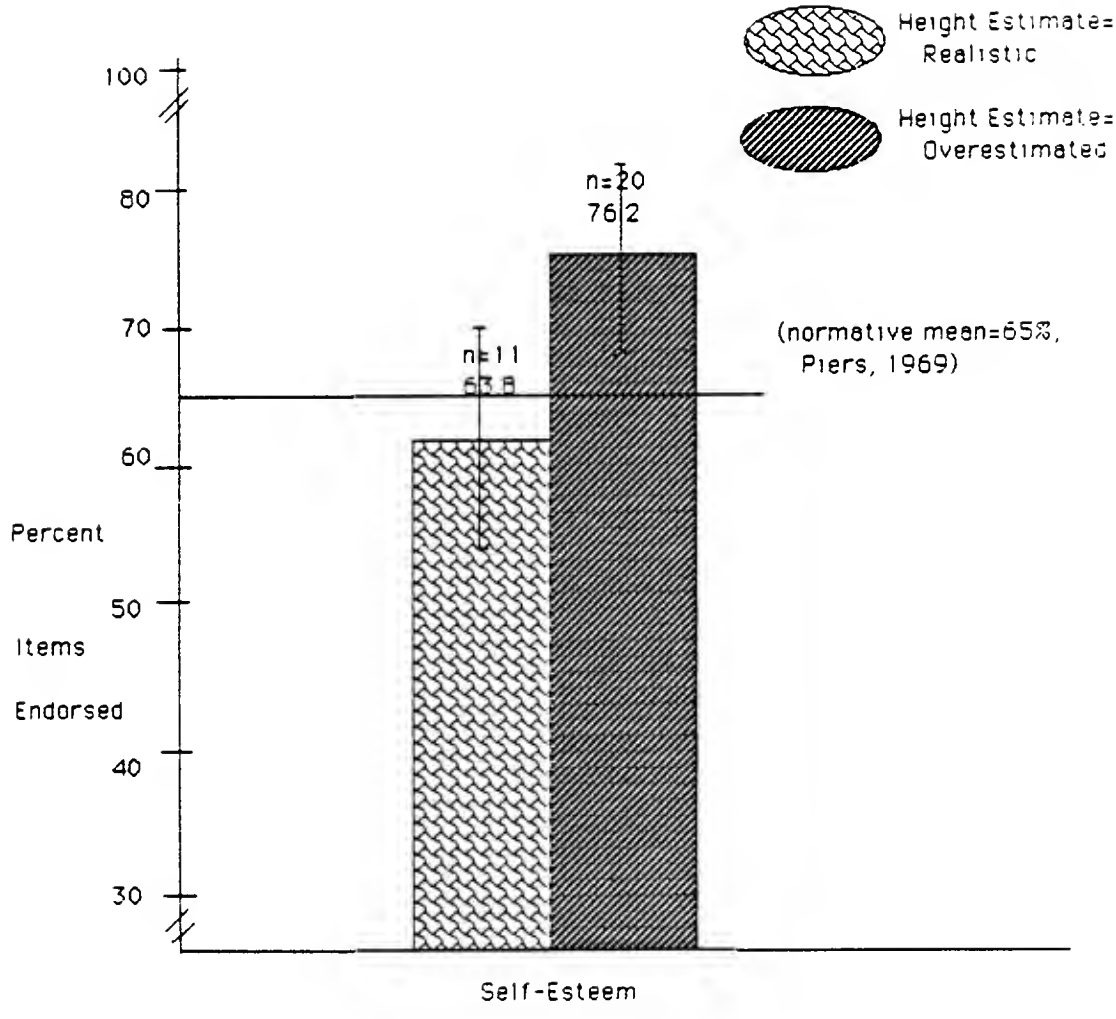

FIGURE 19. Mean self-esteem ratings by height perception. (Actual means are depicted.)

and school status and as being more popular than children who had more realistic perceptions of their height. Figure 20 depicts these comparisons.

The second analysis compared the two perception groups on child ratings of behavior problems on the Youth Self-Report Form of the Child Behavior Checklist. The two groups were not significantly different on these ratings ($F(1,18)=1.11$, $p>.05$).

Ratings by Mothers

The first analysis compared the two height perception groups on maternal ratings of withdrawal, aggression, activity competence, social competence, and school competence. The overall MANOVA showed that the groups were not significantly different on these variables ($F(5,23)=0.84$, $p>.05$).

On the second order factors of internalization and externalization the two perception groups were not rated by their mothers as significantly different ($F(2,28)=0.4$, $p>.05$).

The final MANOVA compared mother ratings of the two perception groups on overall behavior problems and overall social competence. The groups were not significantly different in this analysis ($F(2,25)=1.8$, $p>.05$).

Ratings by Fathers

On the paternal ratings of withdrawal, aggression, activity competence, social competence, and school competence the two height perception groups were not significantly different ($F(5,15)=0.53$, $p>.05$).

The two perception groups were also not rated significantly different on the paternal ratings of internalization and externalization ($F(2,20)=0.4$, $p>.05$).

The final analysis of father ratings compared the two perception groups on ratings of overall behavior problems and overall social competence. Once again, the two groups were not significantly different on these ratings ($F(2,17)=0.1$, $p>.05$).

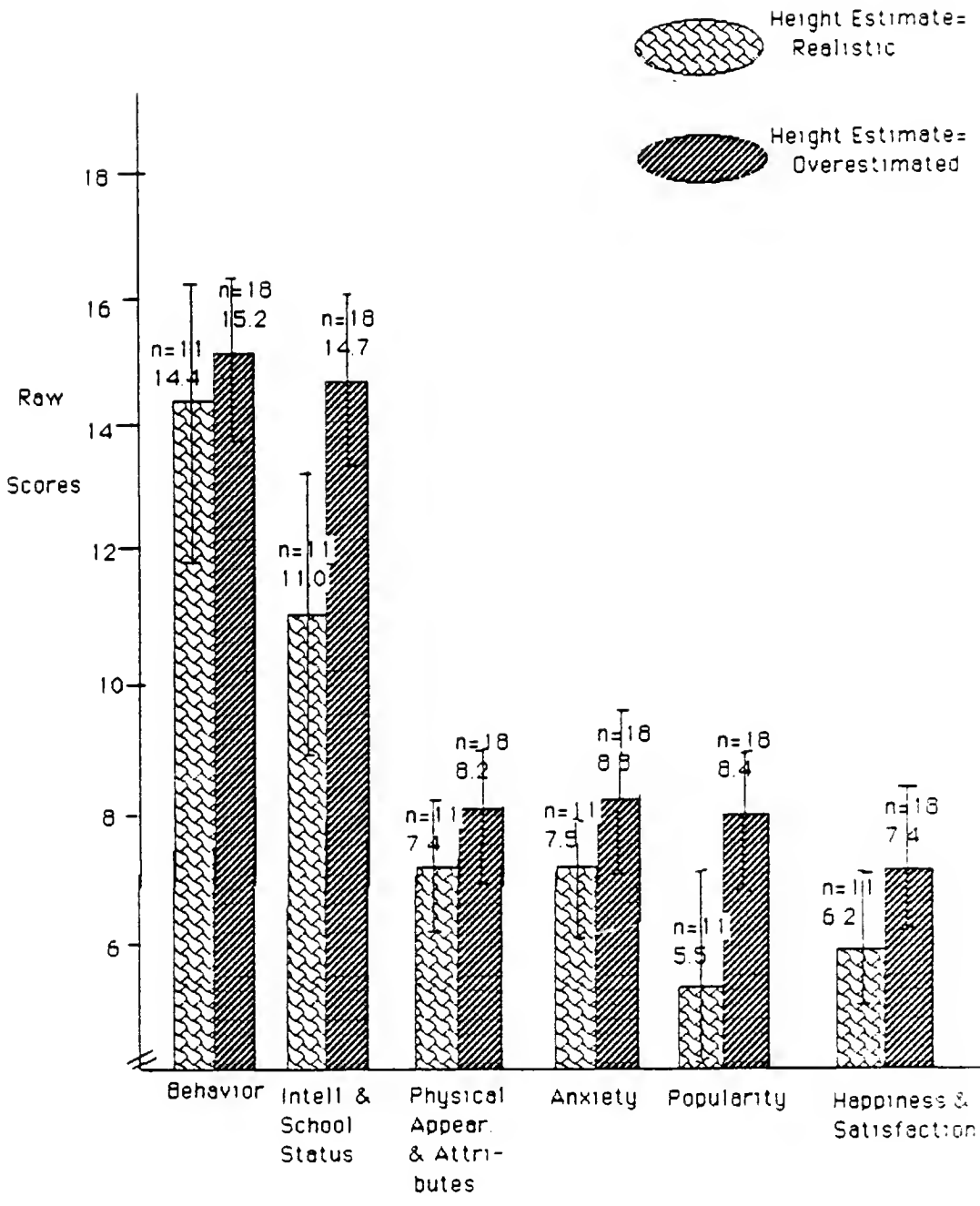

FIGURE 20. Mean ratings on each self-esteem factor by height estimate. (Actual means are depicted.)

Teacher Ratings

The first analysis of teacher ratings compared the two perception groups on ratings of withdrawal and aggression. The two height perception groups were not rated as significantly different on these variables by their teachers ($F(2,19)=0.25, p>.05$).

The second analysis of teacher ratings looked at the second-order factors internalization and externalization. The two height perception groups were not rated as significantly different on these variables by their teachers ($F(2,20)=0.06, p>.05$).

The analysis of teacher ratings of overall behavior problems indicated that the two perception groups were not significantly different on these ratings ($F(1,21)=0.0$, $p>.05$).

The final analysis of teacher ratings compared the two perception groups on four variables - grades, effort, appropriateness of classroom behavior, amount of learning, and happiness. The groups were not rated significantly different on these variables ($F(5,17)=0.12$, $p>.05$). Ratings by teachers of a composite of these scores also did not significantly differentiate the two height perception groups ($F(1,21)=0.01, p>.05$).

Peer Ratings

The first analysis of sociometric data compared the two height perception groups on the PEI factors of withdrawal, aggression, and likeability. The groups were not rated significantly different on these factors ($F(3,13)=0.7$, $p>.05$).

An analysis of classmates nominated as liked the most showed that the two perception groups were not nominated at significantly different rates ($F(1,21)=2.4$, $p>.05$).

An analysis of classmates nominated as liked the least showed that the two perception groups were not nominated at significantly different rates ($F(1,19)=0.5$, $p>.05$).

CHAPTER IV
DISCUSSION

The present investigation studied a group of 45 growth hormone deficient children who were being treated with human growth hormone to increase the likelihood of linear growth. Despite this treatment the height of the group as a whole was less than the fifth percentile for age and sex. Overall the group was 8.15 inches below the mean for age and sex. Thus, regardless of treatment these children were well below the average height expected for their ages and sex.

An interesting issue involves how perceptions of the adjustment of these children vary according to how tall the children perceive themselves to be. Twice as many of the growth hormone deficient children overestimated their height relative to an objective standard than endorsed accurate representations of their height. One might expect perceptions of the children's adjustment to vary depending on how realistic they are about their own height. The only sources who rated the children differently on various measures of adjustment were the children themselves.

Only child self-esteem ratings were related to the children's perception of their height. The children who over-estimated their height rated themselves as having significantly higher intellectual and school status and as being more popular than children with more realistic perceptions of their height (with social desirability accounted for). These children who over-estimate their height could be over-estimating in all areas. They may be very skilled at denying their limitations, whether physical, social, or in other areas. Conversely, the growth hormone deficient children with realistic perceptions of their height may feel that they are also unpopular and low in school status. It is inappropriate to draw a causal conclusion. Nevertheless, one possible explanation for this relationship is that realistic

perceptions of short stature may result in poor self-esteem, particularly concerning popularity and school status. Denial may be a healthy psychological response in this situation. However, it is important to remember that only the children see themselves differently depending on how tall they perceive themselves to be. It does not appear to make a difference in how others see them.

Ratings of the self-esteem and behavioral adjustment of the growth hormone deficient children were also compared to those of normal height children. These growth hormone deficient children were rated as different than normal height children by each of the various sources on a number of dimensions. The growth hormone deficient children rated themselves as having lower self-esteem as a group than did the normal height children, even accounting for a social desirability mindset. Means for both groups were above the normative mean.

In terms of behavior problems, growth hormone deficient and control adolescents with higher Peabody Picture Vocabulary Test (PPVT) scores endorsed almost identical behavior problem scores. At lower PPVT scores, however, the growth hormone deficient adolescents indicated that they were experiencing twice the level of behavior problems (summed across frequency and severity) than were the control adolescents. None of the other informants (mothers, fathers, and teachers) indicated that the growth hormone deficient and control groups were significantly different in overall behavior problems.

Social withdrawal and aggression are behavior problems that have been of particular relevance in studying this group of children in the past. For example, Holmes, Hayford, and Thompson (1982a) found their sample of growth hormone deficient boys to be more withdrawn than normal height boys. Kusalic and Fortin (1975) showed that after 2 1/2 years of growth hormone replacement treatment the growth hormone deficient children they followed had become verbally aggressive. Krims, in 1968, reported tht some short statured children report intense unhappiness only after they begin to grow with growth hormone

treatment. A number of difficulties in accepting treatment have been discussed by Brust, Ford, and Rimoin (1976). These difficulties include feelings of pressure to perform better. Money and Pottitt (1966) termed this difficulty in accepting treatment a "readjustment syndrome" caused by rapid change from disability toward normality.

In the present study, both mothers and peers rated the growth hormone deficient children as significantly more withdrawn than the control children. However, fathers and teachers did not. None of the sources rated the groups differently on aggressive behavior. A more striking finding, however, is in the area of social competence. As assessed in this study it involves the number of activities in which a child participates, the frequency of participation and skill in the activity, the number of friends, frequency and type of contact with those friends, and several school-related measures such as grades, type of class, and problems in school.

The growth hormone deficient children in our sample were rated by both mothers and fathers as being generally less socially competent than the normal height children. Mothers indicated these differences in all three areas assessed - competence in activities, social interactions, and school functioning while fathers endorsed differences in two of the three areas - competence in activities and social interactions. In some cases the growth hormone deficient children's average scores were so low they were close to those obtained by less than 2% of the same age and sex children in the normative population.

A number of the parental ratings of the growth hormone deficient children's social competence were also significantly related to peer ratings of social withdrawal and nominations as a peer liked the least. In those cases parental ratings of poor social competence were related to either high levels of peer-rated social withdrawal or high numbers of nominations as a classmate liked the least.

There are several possible explanations for these relationships. The growth hormone deficient children may not be required to develop various age-appropriate social skills due to their much younger physical appearance. A tendency toward juvenilization of the growth hormone deficient child has been commented upon in several investigations (i.e., Rotnem et al., 1977; Rotnem et al., 1979; Clopper et al., 1986). Another explanation is that the growth hormone deficient child is excluded from age-appropriate activities because of his size. For example, peers may not choose the growth hormone deficient child to be a teammate in sports activities due to the child's short stature.

One last explanation for these relationships between social competence and withdrawal is that the growth hormone deficient child may exclude himself from activities with peers. He may not have developed age-appropriate competencies and so may stay to himself due to embarrassment. For example, he may not know how to play ball and so may avoid participating in activities involving this skill. Peers may interpret this avoidance as social withdrawal. A different explanation is that the growth hormone deficient child is socially competent, yet chooses not to interact with peers, possibly due to embarrassment because of his short stature or having maintained friendships with only younger children.

In terms of the present findings, these social difficulties (withdrawal and lack of competence in activities, social functioning, and school functioning) appear to be the major problem areas faced by the growth hormone deficient children. These social problems were reported by both mothers and fathers, as well as classmates. Therefore, we may assume that these problems are evident both at home and at school.

Teacher ratings indicated that they did not view the growth hormone deficient children as having more behavior problems, including social difficulties, than other children. The structure of the usual classroom may provide a relatively safe social environment for the growth hormone deficient child. The sample of students' behavior that teachers are exposed to

usually involves the students working quietly by themselves. Therefore, teachers may not view the growth hormone deficient child's behavior as different than the norm based on this rather limited sample of behavior. Quiet, withdrawn behavior is relatively adaptive in the classroom. Social competence may not be a major issue there.

Classmates, however, have opportunities to interact with each other throughout the school day. They have a broader sample of behavior from which to determine who is socially withdrawn than do teachers. In the present study, not only did peers rate the growth hormone deficient children as more withdrawn than normal height children, they also nominated them significantly less often as a classmate like the most. While they were not particularly liked, neither were they particularly unpopular. These findings suggest that the growth hormone deficient child may be a socially neglected child.

Neglected children are usually rated as shy by their peers (Coie, Dodge, & Coppotelli, 1982). They do not necessarily exhibit more behavior problems than do average children despite having few particular friends or enemies (French & Wass, 1985). Our results indicate that the growth hormone deficient child fits this pattern. While he does not have more behavior problems than the normal height child, he is less socially competent. His peers see him as withdrawn and he is neither particularly liked nor disliked by them.

While teachers do not see growth hormone deficient children as particularly troubled socially, they do see some difficulties with their classroom behavior. Specifically, teachers rated them as having lower grades, putting forth less effort, learning less, and being less happy than the normal height children. The literature to date does indicate that growth hormone deficient children tend to do poorly academically (see Pollitt & Money, 1964; Siegel & Hopwood, 1986; Holmes, Hayford, & Thompson, 1982b). Research has just begun to investigate the particular types of academic problems these children evidence (Siegel & Hopwood, 1986).

This study shows that different sources do not necessarily rate the behavior of the growth hormone deficient child similarly. Of particular interest in this investigation were mother, father, teacher, and peer ratings of withdrawal and aggression, problems noted in growth hormone deficient children in the past (see Steinhausen & Stahnke, 1976, 1977; Kusalic & Fortin, 1975). Mother and father ratings of withdrawal and aggression were moderately and significantly related to each other as were mother and teacher ratings of aggression and teacher and peer ratings of aggression. The growth hormone deficient children were rated by their parents as generally poor in social competence, a condition which was significantly related, as was previously stated, to peer ratings of withdrawal and nominations as a peer liked the least.

It was expected that the agreement between sources would be different for the growth hormone deficient and normal height children. One explanation for such differences would be a tendency for all sources to see the behavior of the growth hormone deficient child in a generally negative light, or"halo," due to his chronic medical condition. This study found that there was generally more agreement between peer and parent ratings of the normal height children than of the growth hormone deficient children. Sources were generally less in agreement about the behavior of the growth hormone deficient children across settings than they were of the normal height children.

It seems likely that the behavior of the growth hormone deficient child is relatively different at home and at school. Teachers, in general, may not obtain a representative sample of behavior other than that which is appropriate in the classroom. The growth hormone deficient child may well be viewed as withdrawn by classmates, but parents and teachers may not share this perception. Parents do, however, recognize their growth hormone deficient children's deficits in social competence.

The present investigation does have several limitations that should be considered. The sample sizes included are relatively small. This is largely due to the frequency with which growth hormone deficiency occurrs. The psychosocial problems faced by these children are nevertheless important and deserve investigation. A rather large number of statistical analyses were conducted for this study which may increase the experiment-wise error rate. Multivariate analyses were done where possible when logical associations between variables existed. Nevertheless, statistical differences at the .05 probability level should be interpreted with this issue in mind.

Another limitation involves the six factors of the Piers-Harris Self-Concept Scale. Analyses which included these factors should be interpreted cautiously as there is no proof of the factors' reliability or validity. Those analyses are provided as interesting additional information for the reader. One final limitation involves the abscence of self-ratings of aggression and withdrawal by the child. As of this writing there were no behavior problem scales available for the adolescent-completed Youth Self-Report Form of the Child Behavior Checklist. Those should be available with norms and self-rated social competence measures in the near future.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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